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The Electric Lighting of the Pension Building of Washington.

It was quite an undertaking on the part of the Thomson-Houston Electric Company to transport machinery and apparatus from Boston to Washington city, and contract to light the immense Pension building with electric light for the inaugural ball. Some 1,200 incandescent lamps were used, and were particularly well distributed. The special point of commendation is the fact that the plant was put in with such a terrible rush, and under all manner of annoyances, yet did its work thoroughly and well, not a hitch occurring to disturb the perfect success of the ball. Messrs. Royce and Marean, of Washington, did all the wiring, which was of itself proof that everything would be well done. The Standard Underground Company's wires were used. Four Thomson-Houston dynamos, belted one over the other, furnished current for the building. A number of colored lamps were used, and this added to the attractiveness of the interior.

New Intercalating Apparatus.

The accompanying illustrations show a new form of apparatus for portable electric glow lamps, just gotten out by Mix and Genest of Berlin. The device hitherto chiefly in use for double wires, serving to connect portable glow lamps with fixed wires, have the disadvantage that the switches must either be turned (screws or bayonets), or they cannot be turned at all, because the contact pieces are not centrally arranged. In the intercalating apparatus here illustrated, the idea of arranging the two contact pieces of the switch in the form of concentric tubes in and around the switch, has been carried out, and contributes to give the apparatus a solid construction. The contact pieces are connected by soldered copper wire with the segment-like binding screw in the handle. Fig. 1 shows the apparatus complete, while Fig. 2 shows it taken apart, whereby the construction can be seen. The contact pieces of the connecting box are very suitably arranged, the two spring plates and the joint are stamped out of one piece and fastened by one binding screw. The spring pin being split with a conical top, when pressed into the interior contact tube, completes the electric circuit with the ground plate fixed by the second binding screw. Besides its suitable and solid form, this apparatus has the advantage that the intercalation of portable glow lamps can be easily effected in the dark. No turning being necessary, the possibility of injuring the wire at the joining points is very remote. The apparatus can either be fixed on the wall or on a gas tube hanging from the ceiling. In the latter case, the fixing is done by means of a box with flange, secured by a wood rosace, which gives the whole apparatus a ball-like appearance.

—— Mr. O. C. Hartman, president of the Duluth Electric Co., has recently been in Ft. Wayne, arranging for a large increase of the Ft. Wayne Jenney plant, which his company owns. There are now in use in Duluth 175 Jenney arc lights and 150 of the O'Beirne mast arms, made by the Star Iron Tower Co. of this city.

Edison's Grand Exhibit at the Coming Paris Exposition.

Thomas A. Edison has been making preparations for the last six months for an exhibition in the Paris Exposition Universelle, which it is believed will be the most extensive exhibit of the kind ever shown. He has been allotted 8,000 square feet of floor space in the main building, and here he will show models of all his inventions in telegraphy, telephones, electric lighting, and the phonograph. The principal feature of the exhibition will be an enormous model of an incandescent lamp, 40 feet high, the globe being

Fig. 1.

composed of no less than 20,000 incandescent lamp bulbs. The effect, when the light is flashed, will be wonderfully brilliant, illuminating the entire main building. On either side of this exhibit will be the French and American flags worked out in colored incandescent globes. Among other novelties will be a huge dynamo; a series of charts illustrating the growth and development of Mr. Edison's inventions; a large allegorical picture entitled "Menlo Park, the birthplace of the incandescent lamp;" and an incandescent bulb, illuminating a series of designs showing the principal buildings of the world now lighted by the Edison system. The shipping of the exhibits has already been done.

—— City Engineer Fuller, of Troy, N.Y., states that in the specifications for city electric lighting there will be included a provision that employés of the company shall attend every fire with apparatus with which to cut the wires, in case such a proceeding becomes necessary. The company at present has a horse and wagon for that purpose, but is under no compulsion to attend fires.

Moderating the Light of Incandescent Lamps.

The simplest way to moderate the glare of the light of incandescent lamps without losing too much of its lighting power is, according to the *Electrische Anzeiger*, to give the globes a thin coating of collodion. With a little practice the uniform distribution of the collodion coating over the whole surface is soon achieved. Besides simplicity and cheapness, this method presents the additional advantage, that the coat is easy to remove with water. In connection with this communication, the *Polytechnische Notizblatt* recommends to paint the lamps over with a solution of a salt, whereby they are covered by a coat of fine crystals. These innumerable crystals effect a defusion of the light without materially diminishing its intensity. Salts of lead and tin are thought to be the most suitable for this purpose, but other materials may be found more convenient.

New Brush Contracts.

The Brush Electric Company has recently contracted with the New York Life Insurance Company for the installation of the Brush apparatus for lighting all the buildings which the insurance company now has in process of construction, including buildings at Montreal, St. Paul, Omaha and Kansas City. The contracts are worthy of more than passing notice, aggregating as they do, over 7,000 incandescent lights of 16 candle-power each. The main offices of the New York Life Company have been lighted by the Brush system for several years, and it was owing to the satisfaction with which the existing plants were regarded that the contracts for the new buildings were given to the Brush Company.

Fig. 2.

Electricity and Photography.

M. Leon Esquille, a Mexican, it is stated, has perfected a marvellous invention in electricity and photography. By speaking in a photophone transmitter, which consists of a highly-polished diaphragm, reflecting a ray of light, this ray of light is set into vibrations, and a photograph is made of it on a travelling bag of sensitized paper. Now comes the wonderful part. If the image of this photographic tracing is projected by means of an electric arc or oxyhydrogen light upon a solenium receiver, the original speech is then heard. It is evident that there is no limit to the development of this peculiar combination of methods.

A New Form of Faradic Battery.

It is portable—its size and shape permitting it to be conveniently carried in the breast or hip pockets—and its parts are so arranged and adjusted that there is absolutely no leakage from the cell, no "jump" in the current, and the least possible chance for any of the working parts or connections to get out of order or to become corroded.

The method of charging the cell is extremely simple and cleanly, and so easily learned that the servant or office boy may safely be entrusted to perform this service with no possible chance for error except through design.

One cell charge will operate the instrument for eight consecutive hours, with no diminution in the strength of the current within that period.

The cell, coil, rheotome, switch damper and connections are enclosed in a hollow cylinder six inches long by one inch in diameter. This enclosing cylinder forms a handle, to one end of which any desired form of electrode is attached by a convenient

A New Form of Faradic Battery, Manufactured by the Stanley Electric Co.

screw connection, so that it may be readily detached and replaced by another.

The button of the switch which starts and stops the current, and the damper button, which travels in a longitudinal slot let into the side of the handle or case, are immediately under control of the thumb of the operator when the instrument is properly held in his hand.

The greater portion of the tube forming the case is of metal, which, by a sliding switch is connected at will with the wire of one of the poles of the secondary coil, thus making the handle itself one electrode, while the other electrode is attached to the end of the battery case.

This arrangement is one of the most valuable features of the instrument, as it permits any indicated form of treatment in a most convenient manner.

For diagnosis and for internal examination and treatment this arrangement is obviously complete and satisfactory. Not only is the physician enabled to conveniently reach remote parts, but he will always be personally cognizant of the intensity of the passing current, and his sensitive finger will be quicker to note any abnormal action of quivering or wincing of the part under examination than would be possible to any other form of electrode. To the patient, also, the human hand becomes the most agreeable of all electrodes.

The subjoined cut shows one form of this battery. It is manufactured by the Stanley Electric Company, of Philadelphia.

Motors and Electric Railways.

Prof. Frank J. Sprague delivered a very interesting and instructive lecture to the electrical engineers of Sibley College, Cornell University, Friday, March 1st. His subject was "Motors and Electrical Railways." This course of lectures is very largely attended by the student body, and, although the lecture delivered by Prof. Sprague was purely technical in its character, all seemed interested and followed the speaker with marked attention. An hour before the lecture was to be delivered every available seat in the physical lecture room was occupied, and soon the aisles, halls and laboratories were filled to overflowing. Before introducing Prof. Sprague, Dr. Thurston gave a short talk upon electric power and locomotion as compared with that of steam. He also touched upon the distribution of power by electricity in cities and villages, showing the advantages of the electric system, both socially and commercially. Prof. Sprague then took up the subject of motors and railways. He first considered the different kinds of motors and explained their action on long and short distances. A brief description of the construction of these motors was given, showing their efficiency upon different kinds of work. An explanation was given of their action on the different circuits, both constant potential and constant current, as also their arrangement on arc light circuits. A careful study was made of the economy and advantages of these different modes of application. Prof. Sprague pointed out clearly the connections, etc., of the motors, both for railway and stationary purposes; giving account of the things to guard against and the method of overcoming obstacles met with. A set of curves was shown by the lecturer which gave the efficiency of the motors both on railway and stationary lines. A chart was explained by which the cost of wire for line and cost of generating plant could be easily seen for any desired size. The largest number of motors upon any one circuit now in operation is 150 of from one-half to 20 horse-power each. Prof. Sprague stated that after careful study it was found that in the construction of stations, the distance between them should vary directly as the electromotive force. It was stated that from 65 to 75 per cent. of the power received from the engines at the station was delivered by the motors. On a circuit where the motors aggregate 1,000 horse-power, only 400 to 600 horse-power is actually used at any one time upon the circuit. On the Richmond Electric Railway motors aggregating 600 horse-power are used, and it has been found by actual experience that only from 300 to 350 horse-power are used at any one moment. At this point, Prof. Sprague showed some very interesting views of motors in operation running printing presses, elevators, mills and various other lines of work, showing how advantageously the electric motor can be used where any other motive power would be next to impossible. He explained the use of the electric motor in mining work, showing its advantages over every other known system for that line of work. One of the largest mining establishments of this country stated that it was the wisest thing for them to do to introduce electricity as their motive power in the mines, since by this means the ore could be crushed and worked at the mines whereas heretofore it had to be conveyed some distance before this work could be done. Views were given, by the lantern, showing the means of application of the motor to mining purposes. Prof. Sprague then gave an excellent description of the Sprague motor, which was said to have an efficiency of from 90 to 92 per cent. He considered the method of using a large number of small motors instead of one or more very large motors, and thought the efficiency greater by using the small motors. He stated that a large mill was now being designed where 100 motors will be used instead of two or more large ones. The arrangement will be such that one motor will be geared up to each line of shafting, making each independent of the other. This is expected to be a great success, and is being watched with interest. Special reference was made to electric railway work. The speaker described the general workings of the cars, and spoke at some length of the various interesting points of both the Boston and Richmond roads. A large number of interesting views were shown of grades, cars, method of construction, generating stations, etc. A compound shunt wound generator was said to be the best for railway purposes, and low speed engines are preferable to high speed. He spoke at some length of the storage battery system, setting forth its advantages and disadvantages.

Electric Street Cars in Boston.

The Boston Electric West End Railway has been in successful operation for about two months, and we take pleasure in this issue of our paper of presenting a view made from recent photographs of the cars in operation upon that road.

Beacon Street, Boston, Mass., West End Electric Railway.

The engraving represents one of the cars on Beacon street, near Coolidge corner, and was taken just after a snow storm, in which the electric cars, without the aid of snow plows or other electric devices, had plowed their own way through nearly a foot of snow without trouble or difficulty.

The road has been hailed with delight by the many seekers after rapid transit in Boston, who see in it the only solution of this question not involving the enormous expense and hideous appearance of the cumbersome structures required by an elevated railway. The cars run from 15 to 20 miles an hour with ease, and are yet under such perfect control that they can be stopped even when running at full speed, within a distince of one or two feet. In spite of their high speed these cars are more safe than ordinary horse cars running at six or seven miles an hour, since they are under better control, and can be stopped so much more quickly.

—— The City Council of Belleville, Ill., on Monday evening, passed an ordinance giving the Incandescent Light Company, of St. Louis, authority to do business in that city. The company proposes to light private and business houses on reasonable terms.

Proceedings of the Copper Syndicate.

The reported death of President Derfert-Rochereau of the Comptoir d'Escompte, Paris, the big banking house that has all along been backing the copper syndicate formed by the Societé des Métaux, and the subsequent fall in the syndicate's stocks in London and Paris, gave rise to the rumor among copper men last week that the big syndicate was on the eve of dissolution. Later developments on the Metal Exchange and the market reports from London and Boston, however, indicated that the syndicate was in a very flourishing condition, and that a big deal had been consummated which brought all the American copper mines, including the Anaconda, in accord with the copper syndicate. It was stated that the copper syndicate had shrewdly forced the decline in stocks in order to effect satisfactory contracts with the copper producers.

Since the origin of the copper syndicate, 18 months ago, with a capital stock of $2,000,000, it has been forced to buy copper from all parts of the world, and it is now said to have under its control 160,000 tons of copper, representing a capital of about $60,000,000. The extra capital necessary to purchase such an amount of copper has been advanced from time to time by the Comptoir d'Escompte, of which M. Derfert-Rochereau was president.

Last Tuesday's cable despatches announced the sudden death of President Derfert-Rochereau under circumstances that pointed toward suicide. London despatches reported a decline of £4 a ton in spot copper in the London market. There was also a report of a panic in the Paris Bourse and a break in the copper market. The steady buying which the syndicate has indulged in for the last 18 months has forced the price of copper up, and the fluctuations below the average in the Paris and London markets seemed to warrant the rumor yesterday morning that the production of copper had got beyond the control of the syndicate, and the result would be a big crash. It was estimated that the copper syndicate would require $60,000,000 more to carry out its scheme.

There was very little evidence of a panic in the Metal Exchange here, however, as the flurry in London and Paris had little effect on the local market. There was much curiosity among the copper men as to the cause of this sudden disturbance, and general opinion, which seemed to be borne out by the closing reports from London and Boston, pointed toward a compromise between the American producers and copper syndicate. According to the latest cable, the total visible supply of copper in Europe seemed to be about 118,150 tons.

The market closed steadier here, although traders were holding off in view of the reported panicky situation in London and Paris markets. This feeling that matters had been compromised by the producers and the syndicate was further strengthened by a late despatch from Boston stating that copper stocks were jumping, the Boston and Montana having gone up five per cent. from the lowest, and the Calumet and Hecla five. The copper men asserted that the producing companies had evidently come to the conclusion that they must meet the syndicate half-way and help them carry the world's copper supply. This official statement was made public by the copper companies:

All American copper mines, including Anaconda and Calumet and Hecla, are in accord, and proposals which are considered favorable, have been accepted by their executive officers to be ratified by meetings of directors to be called at once. Present letters of credit or guarantees to remain intact.

Copper stocks were strong in Boston all day.

The explanation of the turbulent copper market was given by a copper dealer. He said: "About eight months ago a contract was signed by the syndicate and the copper producers by which the producers were to receive 13½ cents a pound for their copper and a share in the profits. This forced the price of copper up to 16 cents a pound. The demand fell off, and the syndicate found that they had attempted too much under the present contract. The death of President Derfert. Rochereau brought matters to a crisis, and the syndicate determined to make a new contract. Last night there was a meeting at the Brunswick between the Executive Boards of the Anaconda, Hecla, Caulmet, and some of the smaller mines and the representatives of the syndicate. The syndicate proposed that the contract price be reduced to 11½ cents a pound. After a long discussion this was received by the executive boards. They will report to the stockholders, and in all probability it will be accepted."

Jere Abbott & Co., the New York representatives of the copper syndicate, after receiving the news from Boston of a compromise, said that it was true that American copper companies have agreed to the syndicate terms. It was, moreover, stated by copper men that a bank was to be started in London by the syndicate with a capital of £3,000,000, and an issue of debenture bonds to the amount of £600,000.

A Strange Occurrence.

A strange phenomenon occurred near Los Angeles recently. Willie, the eight year old son of James Vanwig, a rancher, started across an open field to join his father, who was at work. Mrs. Vanwig, sitting on the front porch, watched the little fellow plodding across the plowed ground, when suddenly the eyes of the mother and of the father, who had stopped work, watching the little boy coming, were blinded by an indescribable flash of light. When they recovered their vision they saw Willie lying on the ground. He had swooned, and was badly injured. His hair, eyelashes and eyebrows were burnt entirely off. His clothes were scorched and burned in places.

He was resuscitated with great difficulty and has not yet entirely recovered from the shock. His burns were very deep and painful. There was not a single cloud in the sky at the time, nor any wind. Electricity was undoubtedly the cause.

Electric Railways at Davenport, Ia., and Hartford, Conn.

Among the recent electric roads which have been attracting some attention among the street railway men of this country on account of their successful operation are two which we illustrate in this issue of our paper. Of these are the Davenport Central Railway, of Davenport, Ia., and Hartford and Wetherfield R. R., of Conn. The Davenport Central R. R., of which Mr. W. L. Allen is president, was installed about three months ago by the Sprague Electric Railway & Motor Company, of New York, and operates eight electric cars. The grades on this line are some of them extremely long and severe, and required, when mule power was used on the line, a company of four mules to each car. Since the introduction of electric motors the road has been running very successfully, and the gross receipts of the road during the months of Sept., Oct., Nov. and Dec. of 1888, average more than 69 per cent. increase over the gross receipts of the corresponding months of the year before. During a heavy storm last month the road was operated by the electric cars very successfully, and being one of the first experiences of an electric railway in a snow storm, the successful operation of the cars attracted much attention of the street railway men all over the country.

The electric railway illustrated, as in operation in Hartford, has been running about three or four months, and connects Hartford with Wetherfield about three miles away. The overhead system in use is the Sprague, and it is considered a success by the citizens of Hartford.

DAVENPORT (IA.) ELECTRIC RAILWAY.

Important Part Played by the Electric Current on War Ships.

"The countless devices by which electricity is made applicable aboard the new war vessels are simply marvellous," remarked a naval officer recently. "What with furnishing the lights to the vessels, electricity has also been made to serve as the motive power for no end of small hoisting machines about the decks and below, and now it is to be used aboard the 'Chicago' for training some of the heavy main battery guns. It may surprise some persons to know, too, that nearly all these applications of electricity aboard ship have had their origin from the brains of naval officers."

The first general application of incandescent electric lighting to the illumination of steamships occurred only about six years ago, but at the present time no tramp steamer even is complete without it. It was thought for some time that men-of-war could not be so lighted, as the discharge of heavy guns would destroy the incandescent filaments.

The "Trenton" was the first American man-of-war, and in fact the first war vessel afloat, that was lighted by electric light. Her lights were installed in 1888, and at the time her system of lighting created considerable comment from foreign naval officials. The success of the "Trenton's" experiment practically settled the question in naval circles. Since the "Trenton" was given her electric apparatus, the "Omaha," "New Hampshire," "Dolphin," "Atlanta," "Boston" and "Chicago" have been furnished with electric lighting apparatus, and not one of the new vessels just coming will be lighted in any other way but by electricity.

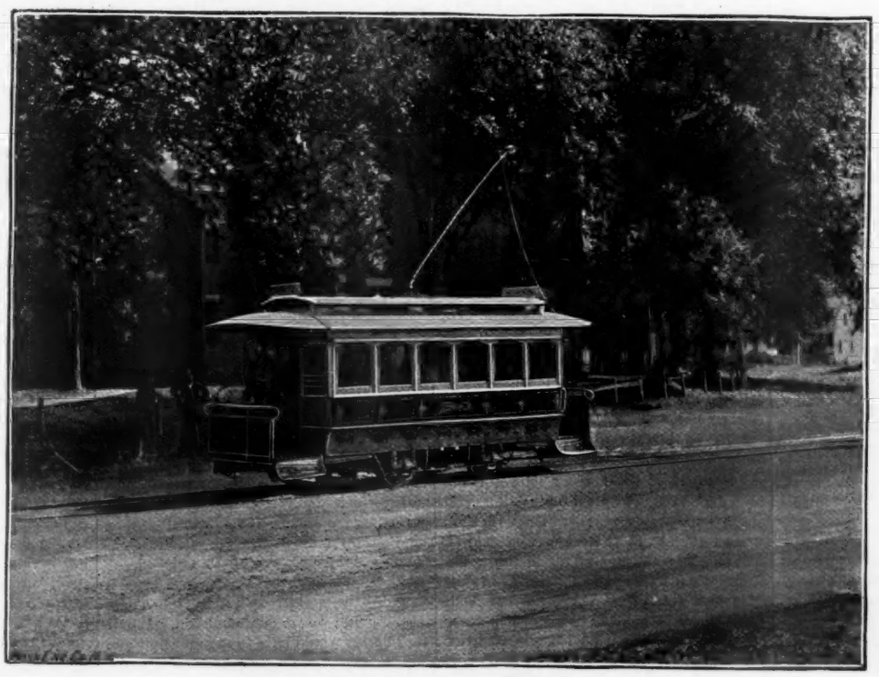
In his report on the electric lighting of naval vessels, Lieutenant-Commander R. B. Bradford, United States Navy, describes the apparatus on the different vessels as follows: "The 'Trenton' has a single Edison incandescent plant * * * and although very heavy and cumbersome compared with plants now manufactured, it has always been thoroughly efficient. The dynamo is shunt-wound, of 100 volts and 120 amperes, and rated as a 150 sixteen candle-light machine. The engine is a 9½ by 12-inch Armington & Sims horizontal and belted. * * There are now 286 lamps on board the 'Trenton.' Perhaps no prettier sight can be imagined than when glancing at the long gun decks some night to see the blue jackets gathered about the little bright glass balls hanging pendant between the guns busily engaged in sewing, patching, or making fancy work. The 'Omaha' has a single Sawyer-Man dynamo on board, which is rated as a 100 sixteen candle-light machine. It is driven by an Armington & Sims horizontal and belted engine. There are about 160 Sawyer-Man lamp installed

"The 'New Hampshire' is lighted by the Edison system. A single shunt-wound dynamo of 100 volts and 240 amperes rated as a 300 sixteen candle-light machine * * * is driven by a 9½ by 12-inch Armington & Sims horizontal belted engine. The 'Dolphin' has on board an Edison shunt-wound dynamo of about 100 volts and 80 amperes, which is rated as a 100 sixteen candle-light machine. It is driven by a 6½ by 8-inch Armington & Sims horizontal belted engine. The ship is installed with 100 lamps.

"The 'Atlanta' has a shunt-wound Webster dynamo of 110 volts, which is rated as a 150 sixteen candle-light machine. It is driven by a 9½ by 12-inch Armington & Sims horizontal belted engine. There are 289 lamps of the Weston pattern installed. The 'Boston' has a compound-wound Brush dynamo of 92 volts and 98 amperes, which is rated as a 150 sixteen candle-light machine. It is driven by a 10 by 12-inch straight line horizontal belted engine. There are 266 lamps of the Swan pattern installed."

The contract for the electric apparatus for the "Chicago" was made with the Edison people. The contract called for over 400 incandescent lamps and a duplicate plant. Each dynamo was specified to be of 100 volts and 160 amperes, compound wound, and rated a 200 16-candle light machine. The driving power for each machine comes from a 12⅛ inch by 10 inch Armington & Sims horizontal belted engine. The entire plant occupies a space of about 20 feet by 6 feet, and weighs 16,400 pounds. The "Chicago" is the first war vessel to be fitted with duplicate plants, and it is expected that electric lights can be depended upon at all times, except in action, when the plant is liable to destruction on account of its exposed position.

Besides the advantage derived from the lighting process to the ship, the value of the electric search lights cannot be too highly estimated. By means of these search lights the presence of a small boat can be detected at the distance of a mile from the war ship on the darkest night. By means of electricity whole broadsides may be fired from the conning tower by the mere pressing of a button.—*N. Y. Times.*



SPRAGUE ELECTRIC RAILWAY, HARTFORD, CONN.

Whatcom, W. T.—The Victoria Water, Gas and Electric Light Company at Whatcom; to establish water works, gas and electric light plant.

Harvard, Ill.—Harvard Electric Company, Harvard, McHenry county; capital, $16,000; incorporators, W. Fay, E. D. Stiles and J. Eason.

Ottawa, Ill—Illinois Valley Electric Light and Power Company; capital, $20,000; incorporators, C. L. Ballad, Lewis Degen and N. E. Degen.

Piedmont, W. Va.—The Piedmont Electric Light and Power Company, capital stock $20,000, has been chartered by G. M. Harrison, J. S. Jamerson, H. G. Buxton, and others.

Boulder, Colo.—The Storey Electric Drill and Power Company, of Boulder, filed certificates of incorporation; capital stock, $150,000. Incorporators, Imile E. Storey, Austin G. Gorman and Henry Van Cleek.

Chicago, Ill.—The Patton Motor Manufacturing Company, at Chicago; capital stock, $250,000; to manufacture and sell motors; incorporators, W. H. Dyrenforth, Charles E. Gaylord, and J. W. Dyrenforth.

Chicago, Ill.—Millard Avenue Electric Company, at Chicago; capital stock, $25,000. To furnish heat, light and power, and deal in apparatus, supplies and machinery. Incorporators, George Martin, M. L. Willard, and A. A. Bliss.

Oneonta, N. Y.—The Electric Construction Company, limited, is organized and is preparing for business. It has $5,000 capital in shares of $50. The directors are F. Gould, F. D. Miller, H. E. Bundy, G. T. Budgen and C. Briggs. It will operate in electric light repairs, construction and fixtures.

Nashville, Tenn.—The incorporators of the Capital Electric Co., to whom the Thomson Houston Company proposes to assign its bid for furnishing the city with 100 to 300 electric lights for a period of three or five years, are as follows: Dr. Thomas A. Atchison, Adolph Dahlgren, W. H. Smith, W. L. Danley and J. H. Ambrose.

Camden, N. J.—The Camden, N. J., Lighting and Heating Co., has elected the following directors: E. A. Armstrong, W. J. Sewell, William S. Scull, William T. Bailey, David Baird, Geo. Barrett, Howard M. Cooper, Rene Gullou, Joseph E. Roberts, J. Willard Morgan and John J. Burleigh. The board subsequently elected E. Ambler Armstrong, president, William T. Bailey, treasurer, and John J. Burleigh, secretary.

Portland, Me.—The New England Julien Electric Company, has been organized at Portland, with a capital stock of $1,000,000; paid in, $1,000,000; par value shares, $100. President, Josiah G. Abbott, of Wellesley, Mass.; treasurer, Samuel A. B. Abbott, Boston, Mass.; directors, Charles Eustis Hubbard, Franklin P. Abbott, Thomas Dean, Josiah G. Abbott, S. A. B. Abbott. The business to be prosecuted is the manufacture and sale of electric apparatus and storage batteries.

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☞ No attention will be paid to communications without the *name and address of the writer.*

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The Metropolitan Opera House, of this city, will be brilliantly lighted by electricity on the occasion of the Centennial Ball, April 29th. Twenty-three hundred incandescent lamps will be used, supplied by the Manhattan Electric Light Company.

The Canadian Commissioner of Patents has decided against the Edison incandescent lamp patent, basing his decision on the ground that the Edison company has failed to comply with the Canadian law, which requires that the patented article shall be manufactured in Canada. A similar decision was rendered in the Bell telephone patent.

The State of Illinois seems to be treading in the uncomfortable path, telephonically speaking, which disgusted Indiana has just abandoned in tears.

We do not hear much of the incandescent gas-burner now-a-days. It does not seem to have the necessary staying qualities. What is the matter with it?

Paper manufacturers are looking more and more toward the employment of electricity in their business. Bleaching processes are already in use and now it is proposed to cleanse rag material also by electricity.

A Western syndicate, with headquarters in Chicago and with a capital of $1,000,000, is said to be buying up a number of street railways, and will spring a new and greatly improved electric motor on the market soon. We will welcome the "spring."

The first number of a new electrical journal has been issued at Barcelona. It is called *Anales de la Electricidad*, and contains, beside editorial announcements, a biographical article, illustrated, on Volta, a notice of the Barcelona exposition, and departments of the telegraph, the telephone, electric motors and book notices.

On the heels of the Bate Refrigerator decision, it is announced that one of the Edison Lamp patents in Canada has been annulled by the Commissioner of Patents of Canada. This is, of course, not final, and, like the decisions of our own commissioner, is appealable. We have no particulars at this writing and cannot reflect on the scope of such decision.

We have not observed any great activity among the adaptation inventors in the direction of the minor domestic wants. What a chance for some one to electrically lull the nation's infants with an electro-motive crib, or soothe the heartburns of coffee-grinding, the aggravations of the ice cream freezer, etc. We give the suggestion gratis.

The new law requiring capital punishment to be by electricity is calling forth quite a number of proposed new words to describe the catastrophe. "Electrolethe," one of the latest, is accurately descriptive, properly formed, and perhaps also "electrocution"; but neither fills the bill as expressive of the sheriff's act or as replacing the sentence of the judge, "hanged by the neck till you are dead." A little more invention is needed on the part of the philologists.

The *Evening World's* story, "The Conquest of the Air," by the ingenious Jules Verne, is replete with hints to the electrical inventor. His storage batteries are the *ne plus ultra* of accumulators, being feather-weight and as capacious as a sponge. The author gets the voyagers into a mess twice by sudden failure of the electric current temporarily, once in a tremendous lightning storm and again when hovering over the South Pole. The tale is very interesting as romancing a by no means impossible use of electric current. If any source of energy can be used to successfully cope against gravitation, it will certainly be electrical.

An electrical shoal water indicator has been devised by two Mexican inventors. It consists of a strong cylinder filled with shot, so that when hung by a cable from a ship it will remain perfectly upright in the water. Embedded in its center is a glass or vulcanite tube half full of mercury, the two ends being closed by metallic plates, which are in communication, by insulated wires carried by the cable, with an electric battery and bell on the deck of the ship. The action of the appatatus is as follows: When the vessel approaches shallow water the cylinder drags on the ground below, and is consequently no longer upright, but is thrown on its side. This causes the mercury in the tube to touch both the metallic plates attached to that tube, as above explained; the electrical circuit thus becomes complete, and the warning bell on the ship instantly rings.

THAT INTERESTING NIAGARA FALLS PROBLEM.

Not long since a Chicago man proposed to utilize the force of Niagara's cataract by shafting from the shore to about the level of the water below the falls, drifting to the fall, and placing all the necessary machinery in a huge underground room, where the generators would supply untold force to run machines of every description at Buffalo, and light the town as well.

A second inventor has a different way of getting at it. His plan is to swing a coffer dam into the American channel about 150 feet above the falls, where the water is but 10 or 12 feet deep. The dam will be 120 feet by 35, and 25 feet high, and made of three steel walls, with a prow or boat-like bow pointing up stream. He will sink it, and fill in the space between the outer walls with concrete until the center can be pumped out. The whole will then be permanently fixed to the rock. Thus like the choking cow will the obstruction (coffer dam) head off the water and allow the sinking of a 90-foot shaft through the limestone. Here at right angles to the shaft a drift will be run to the face of the precipice. A suction pipe will be put through the shaft, and turbine wheels within it. Openings for inflowing water will be made in the stern of the coffer dam, so that the dynamos of 350 to 500 horse power, located in upper stories of the dam structure, will transmit the current generated to the consumers through an underground tunnel leading from the dam to the shore.

A third plan has been proposed. A deep narrow channel is to be built like a sewer, if you please, from Buffalo to the falls, and covered up permanently. This will tap the lake or the river near Black Rock, or Fort Porter. The right of way being in the hands of a syndicate, a mill of any kind may be placed anywhere on the route. Build your station, open up the subterranean way, stick in your wheel, and there you are! You have just as much power as the fellow above you, and the man below is your equal in the same way.

It is more than 30 years since the first horse car entered Boston. It came from Cambridge, and was greeted by a large crowd as it stopped in Bowdoin square. What would that crowd have said if it was then publicly announced that the horse would be abolished one day, and that the substitute power would not be steam, but lightning, such as Morse had recently utilized for transmitting messages? To-day, however, sees the fulfilment of another claim of the advocates of electricity, for electric street trains are running between Cambridge and Boston. North avenue, Cambridge, residents were the first favored, but people living at intermediate points were not slow to take advantage of the change. Consequently the horses have light work to-day, as everybody seems anxious to test the electric system. Early in the morning trips were made in remarkably short time, although one of the first trains was delayed in Harvard square for about 10 minutes. The cars run very smoothly and passengers, conductors and drivers, or as the latter should be called, brakemen, express much satisfaction. Said one brakeman, as he turned the crank: "This is better than holding up four nags. The electric runs smooth as glass. See those rails there? Well, if a cord would slip anywhere it would be there. But, see, it slides right along. And up hill we go like a charm. Where four horses would have to tug and pull and slip, we skim right along. Oh, this is young yet, but will do great things before long." Some horses seem to act rather shyly when they see the horseless vehicles. Yet the average equine displays no greater alarm than to prick up his ears and stare at the novel sight. There are about seven trains of two cars each already running between Bowdoin square and North avenue. They have worked so successfully that more will be put on at once.—*Boston Globe.*

AN IMPORTANT FIELD.

A comparatively new field in which electric illumination promises to become exceedingly prominent, is in the lighting of breweries and distilleries. In conversation recently with a gentleman well informed on the subject, it was stated that a majority of fires occurring in breweries and distilleries result from explosions of inflammable gases coming in contact with gas jets. Incandescent lights would do away with this danger, and have already been installed in several instances with most satisfactory results. In a short time, it is predicted, no such establishment in the country can afford to be without electric illumination.

Electric Club Notes.

Seventeen new members of the Club were elected February 28th. About as many more have made application.

Mr. E. T. Gilliland, president of the Club, will leave for Paris in a few weeks and will see that the headquarters of the Electric Club at the Exposition are properly arranged.

Several of the members of the Electric Club were Washington visitors during the inaugural, and were specially noticed for their grace and fine appearance at the inaugural ball.

The lecture on "Light and Color" which will be delivered by Prof. Spice, of Cooper Institute, Thursday evening of this week, (March 14th), will be illustrated throughout, and will be of great interest. Prof. Spice is an accomplished lecturer, and the members of the Club who attend will be instructed as well as entertained.

The regular meeting of the Club for nominating officers for the year beginning May 1st, 1889, occurs Thursday evening, March 21st. The annual meeting for the election of officers occurs one month later, April 18th, the third Thursday in April, as provided by the by-laws of the Club, and will be the occasion of a social and intellectual entertainment provided by the members of the Club.

PERSONAL.

Mr. Geo. M. Meyers, of Kansas City, Mo., well known in telegraphic circles of the West, was in New York the past week.

Dr. Joseph B. de Lery, of the Wenstrom Electric Company, is exhibiting his new dynamo in this city at No. 5 Dey street.

A. L. Reinmann, superintendent of the Westinghouse incandescent lamp factory at Pittsburgh, Pa., was a visitor at the Electric Club last week with Dr. Cyrus O Baker, of Newark, N. J.

Dr. Leonard Waldo, general manager of the Cowles Electric Smelting and Aluminum Company, Lockport, N. Y., was a New York visitor last week, stopping at the Electric Club. His company is very busy.

Col. J. N. Keller has accepted the position of general manager of the New England Telephone and Telegraph Company, and took charge of the company March 1st. Col. Keller is one of the most active and successful telephone men in this country.

Mr. George W. Stone, of Messrs. George W. Stone & Company, electrical and manufacturing contractors, of Wilmington, Delaware, was a New York visitor last week, and reports the electrical business in his city and the South as rapidly advancing.

Mr. D. P. Perry, vice-president and general manager, Sperry Electric Company, has been seriously ill and confined to his room during the past week, through having caught a severe cold at the Exposition Building. Yet, Mr. Perry feels elated over the grand results obtained through drawing such immense crowds to the electrical exhibit.

Mr. Elmer A. Sperry, of the same company, who was called away during the Convention to Cortland, N. Y., by the death of his aged father, returned to Chicago by way of Washington, D. C., where he secured a valuable patent covering 31 distinct claims on his new invention. Two other patents have also been granted him during the last two weeks.

The News in Electrical Circles.

Electric Welding—Underground Work—Telephone Legislation—Drawbaugh's Telephone Claims Withdrawn, etc., etc.

OUR BOSTON LETTER.

Welding Exhibition.—On last Monday evening a party of about 50 gentlemen, largely composed of press representatives, availed themselves of the invitation extended by Mr. H. A. Royce, general manager of the Thomson Electric Welding Company, to witness the operations of electric welding at the Malden Electric Light Company's station. This model station, with its brilliant illumination and convenient arrangement, was an excellent selection for the exhibition. Three welding machines were shown specially adapted to different classes of work, although no one machine is confined to one metal or size. The construction of the machines and technical details are already familiar to the readers of the REVIEW.

Mr. Hermann Lemp, electrician of the company, had supervision of the welding exhibition, which was made by Mr. Russell Robb. The operations began with the welding of several pieces of iron, copper, brass, etc., of various sizes, and both in bars and in pipes. The work was done so simply and effectively, both in the electrical functions and also in the mechanical manipulation, that it aroused the admiration and enthusiasm of the spectators. Solid bars of iron two inches in diameter were welded with ease, and also a two inch pipe, leaving but a very slight ridge inside. The joints were filed down to show the homogeneity of the metal, and in one or two instances Mr. Lemp twisted and bent the welded bars until they broke, but never at the point of the weld.

Altogether the evening was most enjoyably spent, and the thanks of the visitors are due to Mr. Royce and Mr. O. K. Stuart, who also helped entertain the party, and to Messrs. Lemp and Robb, for a most interesting and profitable excursion.

Before the Aldermen.—At the Monday evening meeting of the Board of Aldermen a remonstrance was received against the granting of any further permits for overhead wires in the streets for the purpose of conveying electricity for traction or motive power, because of the obstruction claimed to result in the proper handling of ladders and other fire apparatus, and also because of the danger of fire from other wires coming into contact with them. The remonstrance, which comes almost entirely from insurance people, was referred to the board as a committee of the whole. The annual report of the superintendent of lamps was presented and placed on file. The appropriation for the year ending April 30, 1889, was $567,500; the balance unexpended is $175,600, which is sufficient for the remainder of the year. The difference in the cost of gas, oil and electric lights in the last two years is as follows:

	1887.	1888.
Gas	$260,666.31	$245,337.80
Oil	5,274.55	6,011.68
Electrics	125,740.78	151,413.05
	$391,681.64	$402,762.53

The total number of new lamps of all kinds set up during the year was 718.

"C. & C." Removal.—The New England agents of the "C. & C." Motor Company, Messrs. Howard & Stone, have removed their offices to 32 Oliver street, where they have various kinds of machinery in practical operation, run by electric power. The elegant factory facilities of the "C. & C." Company enable them to show motors of all sizes, large and small, and fill orders immediately.

New Incorporation.—The recent sale of the manufacturing business of Mr. A. L. Russell to the firm of Holtzer & Cabot of 111 Arch street, together with the large business already carried on by Messrs. Holtzer & Cabot, have decided them to form a corporation, which has been done under the laws of Massachusetts, the charter giving them the right to manufacture all kinds of electric machinery and appliances. The capital stock is $50,000, and the officers are: C. W. Holtzer, president; G. E. Cabot, treasurer; H. A. Foster, secretary.

Electric Club Matters.—The regular monthly meeting of the Electric Club was held at the new rooms, 7 Park street, on Monday evening. Several constitutional amendments were adopted, and it was voted to establish a buffet where refreshments will be served. The second monthly dinner at Young's was well attended Wednesday evening. President Denver was in the chair, and the club entertained as guests Dr. Moses Greeley Parker of Lowell, Aldermen Gove, Stacey and Kelley, Mr. Francis A. Houston, Prof. R. J. Monks and Mr. Ernst Thurmauer of Hamburg. The after dinner speeches were by Aldermen Kelley, Stacey and Gove, Vice-President Cram and Mr. Frank Ridlon. Dr. Moses Greeley Parker then read an interesting paper on "Peculiar Rotary Motions Found in Lightning and Other Electrical Currents," which, though similar to the recent paper before the New York Club, contained much new and entertaining matter.

More Welding Exhibitions.—The Thomson Electric Welding Company entertained a large number of distinguished men at Malden Thursday evening with another exhibition of the electric welding processes. Mr. H. A. Royce and Mr. Otis K. Stuart received the guests, among whom were Gov. Ames, Oakes Ames, Prof. Elihu Thomson, Mr. C. A. Coffin, Mr. E. Wilbur Rice, Mr. H. D. Hyde, Prof. Dolbear and Mr. Tregoning. The exhibition was given by Mr. Lemp and Mr. Robb. On next Wednesday evening the members of the Electric Club are invited to visit Malden as the guests of the Thomson Electric Welding Company.

New Management.—Mr. John P. Gregory is now the manager of the Union Glass Company, and a handsome suite of offices and show rooms have been taken by the company at 36 India street. The company will now more than ever enter the electrical field, where its products are so favorably known.

A Boston Branch.—The Marr Construction Company, of Pittsburgh, are now represented in New England by Mr. Norman Marshall, who has offices in the Hathaway Building, 620 Atlantic avenue.

Westinghouse Sawyer-Man News.—Mr. W. A. Carey has been rewarded for his efficient and business-like management of the New England office of the Sawyer-Man Company, by the appointment of district agent of the Westinghouse and Sawyer-Man Companies, his territory being all east of the Connecticut river. Mr. Carey's many friends in this vicinity will be glad to learn of this deserved promotion, and also that Mr. Carey's head quarters will be as formerly, at 620 Atlantic avenue, this city. Recent sales by this agency are: A 30 arc light Waterhouse plant for Whitlen, Burdette & Young, Boston, and also a 250 light Westinghouse incandescent for same firm; two 1,500 light machines, Westinghouse alternating system, for the United Electric Light Company, of Springfield, Mass.; one 1,500 light machine like the above, for the New Bedford Electric Light Company; a 750 light machine, also Westinghouse alternating system, for the Newport Electric Company, and another of the same kind, of 3,000 lights capacity, for the Narragansett Electric Company, of Providence. Large numbers of the Westinghouse alternating current meter are being sold for use in various stations without regard to system employed, and the supply is unequal to the demand.

One of the new Forbes direct current meters, recently purchased by the Westinghouse Company, has arrived at the Boston office where it may be seen at any time. It is a model of fine workmanship and handsomely gotten up.

New Agencies.—The firm of Spaulding & Buck is now comfortably established in pleasant offices at 620 Atlantic avenue. The firm is composed of Mr. F. C. Spaulding and Mr. H. A. Buck, and they are doing business in the line of electrical supplies, light and power installations, making a specialty of the artistic illumination of private residences a specialty. Holding as they do, the exclusive New England agency for the Continental Dynamo Company, and a general agency for the Eddy Electric Manufacturing Company's motors, the new firm is in a position to, and doubtless will, do a large business.

Boston, March 11, 1889. T. W. S.

OUR LETTER FROM THE SOUTH.

Legislative Idiocy.—There is a bill pending before the North Carolina Legislature to regulate telephone charges, which fixes the rate at $40 a year for business houses, and $20 a year for private residences.

Extension of Electric Road.—It is intended to extend the Roanoke, Va., electric railway from that city to Salem, Va., which will give the company a continuous line of 10 miles. The addition of 10 miles on the streets of the city will give the company 20 miles of electric street railway, the longest, except one, in the world.

New Electric Light Company.—The city council of Thomasville, Ga., has granted the privilege of erecting and operating an electric light plant. The Thomson-Houston system will be used. Lights are to be turned on within four months.

Will Light the City.—The Albany (Ga.) Edison Incandescent Electric Light Company have contracted to light the city, and will probably have to enlarge their plant.

Electric Fixture Contract.—T. W. Wilmarth & Co., Chicago, have received contract for gas and electric fixtures for new State capitol, at Atlanta, at $10,000.

Light for Cotton Mills.—The La Grange (Ga.) cotton mills, the machinery for which is now being placed, are negotiating for electric lights. It is probable that the city will join with the mills. The oil mill, plow works, variety works, two colleges, etc., will consummate a trade for the lighting of all within next 60 days.

EDWARD A. OLDHAM.

Charleston, S. C., March 6, 1889.

OUR CHICAGO LETTER.

More Underground Work.—Chief Foley, of the Milwaukee Fire Department, in his annual report, recommends an extension of the underground system of fire alarm and police wires, the experimental lines, which have been undergrounded since last summer in the East division of the city, having worked perfectly well. He wants the West and South divisions included. 5,800 feet of conduit have been laid, the expense being $5,348.

Failed to keep the Contract.—The Fort Wayne Jenney Company is at loggerheads with Charles U. Heiser, and has filed a bill in the Superior Court to compel him to perform his part of a contract. The company says he rented it an office and agreed to furnish power for an electric light plant, but has not done so.

A Rapid Transit Co.—An Electric Rapid Transit and Lighting Company has been formed here, with $250,000 capital; the object of which corporation is to run an electric main from Western avenue northwest on Elston avenue to Jefferson Park, with branches tapped in for Avondale, Irving Park, the county buildings at Jefferson, and for Montrose. A branch will reach out for Bowmansville and another will ask patronage from Cragin and vicinity. Both light and power will be contracted for.

The Horse and the Magnet.—Mr. J. C. Henry, of San Diego, Cal., says that with a magnet it is easy to test if a horse's foot is tender, one terminal of the machine being connected to the bit and the other to the shoe. If there is no irritation, there is no nail pricking the quick. If there is, I may add, the fellow holding the horse's foot—if it is near the back premises of the animal—will usually find it out the same afternoon. He says: "A little electrical science in the blacksmith's shop would locate much suffering." So it would, my child; so it would; and the less science, the more suffering you would get out of it.

A Dinner.—The National Electric Manufacturing Company, of Eau Claire, Wis., gave a complimentary dinner at the Sherman House on the 23d. W. K. Freeman and Chas. Kammeyer were the principals on the festive occasion.

High and Low Tension.—One of the hardest blows on the underground advocates was struck the other day up in the Northwest. An electric light (low tension) company objected to going into the same conduit with a high tension system occupying consecutive ducts, for fear the induction would vitiate their current.

Arc Light Burned the Shingle.—I heard of an argument which is pretty nearly a standoff from the other side of the high and low controversy, which was used before a committee. The claim was made that only a low tension current could produce fire. That an arc light would not burn a dry shingle if you put it right in the flame! When the low tension fellow got a chance at a subsequent session, he filled the committee room so full of burnt shingle smoke that the department turned out with a general alarm, supposing the council chamber was on fire.

Suing for Damages.—Owen O'Neil, who was lineman in March, 1887, for the Municipal Electric Light Company, of Chicago, is suing the company for $5,000 damages for the loss of a finger and six months lying idle on account of injuries received while repairing a live line. Another party here has been in court claiming damages from the proprietor of a West side theatre for serious injuries received while sitting in a trick chair at an electrical show. The defence, when the case was called, asked a continuance on the ground that the principal and important witness—the showman—was in Scotland and could not be reached. The case was continued for *two years!* Other parties who were caught in the same chair, even a Chinaman, simply laughed at the joke, but this one claims he was seriously, if not permanently, injured.

The De Bausset Flying Machine.—The Chicago Electric Club at its regular meeting on the 4th, was addressed by Dr. Arthur de Bausset, who very carefully, by diagrams and the blackboard, explained the proposed aeroplanes or air-ship, which he is endeavoring to build. There is a great variety of opinion as to the feasibility of the doctor's vacuum system, but a very general interest was manifest in the close attention which was paid to his explanations. Quite a lengthly discussion followed, which was partaken in by Messrs. Dyrenforth, Whitmore, Kempt and others. The aeroplane is to be handled, raised and lowered, driven and steered, solely by electric energy. Its buoyancy will be controlled by the more or less perfect exhaustion of the cylinder, instead of being made to float by being filled with a gas lighter than air.

Illinois Telephone Legislation.—The telephone question seems near to fruition. In the Senate of this State a bill has been adopted by a vote 37 yeas to no nays; absent, 7; present but not voting 4. Then a similar bill came up in the House. There were several druggists who were active in the recent rebellion, accidently in Springfield, who took a hand in the game. Representative Baker, who has been championing the bill, forced the House Committee on Judiciary to report favorably. Absent members telegraphed asking delay in action until they could arrive, and one committee member said while he personably had no objection to reporting favorably, he did not like to act, as they were doing, on mere parol evidence. The vote on postponment stood 11 to 6. Mr. Baker was rather prolific of expletives and poetical imagery. He remarked that for "fiendish ingenuity" he believed the Chicago Company deserved the blue ribbon. The bag-kneed old story of $60 per annum when the exchange was a matter of 1,200 subscribers, and the stockholders were satisfied, came as freshly to the front as a clown after a mock somersault. The legislature was asked to stop this "bleeding of the public." Then came the table of charges of other places compared with Chicago, and

"Lo! Chicago's rates led all the rest!"

An attempt to make the maximum $96 instead of $72 per annum failed. The committee lacked one of a quorum, when a vote was taken on the recommendation of the bill, seven members not voting. Just here a Chicago druggist, who happened to be in Springfield, added the weight of his voice, "to quiet the general outcry against this rapacious monopoly." A motion to adjourn was lost, not a sufficient number to make a quorum voting. In came a belated member, the vote on favorable report was again taken, and 13 members voted aye, which being a quorum, reported the bill back to the House. That was the status of things Friday.

Official Changes.—The changes, in *personelle*, resulting from the recent trades in electric light companies, are many. Mr. C. C. Warren and others, from the United States Company, are now to be found at the Thomson-Houston offices. Mr. Geo. O. Fairbanks, general district agent of the Westinghouse, for Illinois, lower Michigan and Indiana, takes the office in the Rookery, retaining most of the old clerical force. Mr. C. D. Shain and Mr. E. S. Hewson, also, will remain, and the business of the Westinghouse, the United States, and the Sawyer-Man Companies will all be conducted from this office, yet the individuality of the various corporations will remain intact. The impertinent question has been asked: "What becomes of the letter books of an agency when such transfers are made?

Conduits in Milwaukee.—Milwaukee will wrestle with the underground problem in the spring. The Wisconsin Telephone Company will bury its wires, going through the alleys in conduits constructed of boards thoroughly soaked in gas tar. At each block a pole will be erected for distribution within that block. C. C. H.

Chicago, March 9, 1889.

OUR WASHINGTON LETTER.

Electric Lighting Bids.—At the recent opening of bids for lighting the Baltimore Post Office, proposals were received from the Edison United Manufacturing Company for the entire plant, at $33,000; the Marr Construction Company, of Pittsburgh, for the wiring only, at $7,523.50, and from the Brush Electric Light Company, of Baltimore, for furnishing the current at $\frac{1}{1000}$ of one cent per ampere hour, or 50 cents per month per 16 c. p. lamp. The lighting of the building will require 1,500 16 c. p. lamps. The absence of Supt. Powell has prevented any action on the bids up to this time.

The U. S. Company Control the Field.—The provision in the law prohibiting the district authorities from making a contract for street lighting in this city with any company except the Local United States Company was not amended by Congress, and Supt. Renshaw remains in command of the situation. He is preparing to lay about six miles of Lake conduit early in the spring. This work will extend the system to Georgetown and other outlying points.

Drawbaugh's Telephone Claims Withdrawn.—Another very important telephone case has been finally disposed of by the withdrawal of all the Drawbaugh claims for a patent for a magneto telephone. Drawbaugh's application was rejected by the Patent Office on the ground of two years' public use of the Bell telephone before it was filed; but the applicants denied this, and have been pushing the case with great vigor and determination until now. If they had gained their point and secured a patent for another 17 years, it would have made things very interesting for Bell licensees.

Electric Railway Extension.—The amendment to the Eckington Roads' charter, authorizing its extension to the Treasury Department, by cable or underground electric line, failed to pass for lack of time. The new cars on the road are doing excellent service. There is a hitch in the affairs of the Rock Creek Road, and its construction will be somewhat delayed. The directors of the company could not agree upon giving the contract to either the Sprague or the Thomson-Houston Company, and no other company has yet come forward with a proposition to do the work.

Washington, March 8, 1889. G. C. M.

Telephonic News

⁂ The Paradise Telephone Company has completed a telephone line from Paradise to Chico, Cal.

⁂ The *Buffalo News* attributes its success very largely to the use of the long-distance telephone in gathering news.

⁂ Missouri talks of passing a telephone bill limiting rentals to $3 or $4 per month. If either bill passes the telephone company threaten to stop the service.

⁂ Inasmuch as Sioux Falls has no police or fire alarm service, it is proposed to furnish the night clerk of the Cataract House with a police whistle, and to that place all alarms can be telephoned.

⁂ The current number of the *Revue Internationale de L'Electricite* contains an interesting illustrated article by Captain Waffelaert, on a system of telegraphing or telephoning for use in the army, the apparatus being portable.

⁂ The Long Distance Telephone Company has decided to charge the following regular rates for five minutes' use of its wires from Rochester: to Buffalo, 75 cents; Syracuse, $1; Utica, $1.25; Albany and Troy, $2.50; New York, $3.50; Philadelphia, $4.50; Boston, $5.25.

⁂ The Connecticut Senate has passed a bill imposing a fine not to exceed $500 on any person who shall make a connection by wire or otherwise with any telegraph or telephone wire, not owned or leased by such person, for the purpose of obtaining information or listening to the transmission of messages.

⁂ The Indiana legislature has repealed the telephone law passed four years ago fixing telephone charges to $3 per month. There are two or three bills pending in the House proposing to regulate the charges made by the companies, and there is a possibility that one of them, raising the present rate considerably, may be passed.

⁂ Gov. Hovey (Ind.) signed the bill repealing the telephone rate law of 1885, last week, saying to some friends who were present at the time that he signed the bill with greater pleasure than any presented to him this session. It is promised by the telephone officials that the service shall be restored to what it was before the passage of the law, which is a result much to be desired.

⁂ The Bell Telephone Company at Buffalo is hard at work putting its wires underground, and claims to be more anxious to get them all buried than anybody else in the city. All the expert labor that can be obtained has been hired. Manager Hall said on Friday that about 100 circuits had now been buried, and they would continue to go down at the rate of about 25 a day. In all there are 2,000 miles of wires underground.

⁂ John Crawford, who has been division manager of the East Pennsylvania Telephone Company in Harrisburg, Pa., since August, 1886, has tendered his resignation to the general manager of the company, to take effect April 1. Mr. Crawford will go to Mexico, to take charge of the recently organized Mexican Telephone Company, having been elected to the position of general manager at a meeting of the directors of the company held in Boston last Wednesday.

⁂ An agreement between the White Mountain Telegraph and Telephone Company and the Bell Company was ratified in Portland, Me., and the patents and inventions of Dr. Robie Blake and the property of the White Mountain Company is transferred to the Bell Company. The agreement will bear date February 1. It will be possible to telephone 200 miles as easily as across the city. There will be no need of the long-distance arrangement, as the Blake arrangement will be placed on every instrument without extra cost.—*Exchange.*

⁂ The newspapers of Buffalo and Rochester are filled with interesting accounts of talks over the long distance telephone lines with the cities of New York, Philadelphia and Boston. The excellence of the service evidently surprised the newspaper boys.

⁂ In Omaha an ordinance is now before the city council to grant to the Omaha Subway Car Company permission to put electric subways in the streets and alleys of the city. An electric subway is a small tunnel occupied by small conduits through which are run electric wires for various purposes. It is designated as a means to do away with overhead telephone, telegraph, electric light, and electric motor wires; and the company which asks for a franchise proposes to build the subway and rent it, or parts of it, to various companies in Omaha which use electric wires. The ordinance now before the council has been examined, amended and finally approved by the city attorney. It protects the rights and interests of the city, and carefully guards against monopoly and unjust charges. If the Dorset subway system, which this company proposes to put in shall not prove to be practicable, or if its charges are unreasonable, it alone will be the sufferer.

The Underground Telephone Wire Work in New York City.

The Metropolitan Telephone and Telegraph Company has expended a very large sum of money in preparing for underground service in New York City. We present diagrams showing location of the cables, as well as showing the trunk line system connecting the exchanges, which will be of particular interest to all telephone people. There are now over 6,000 miles of telephone wire underground in this city. These wires are contained in 53 miles of cable, which have been drawn into the underground subway constructed under the direction of the Board of Electrical Control of New York.

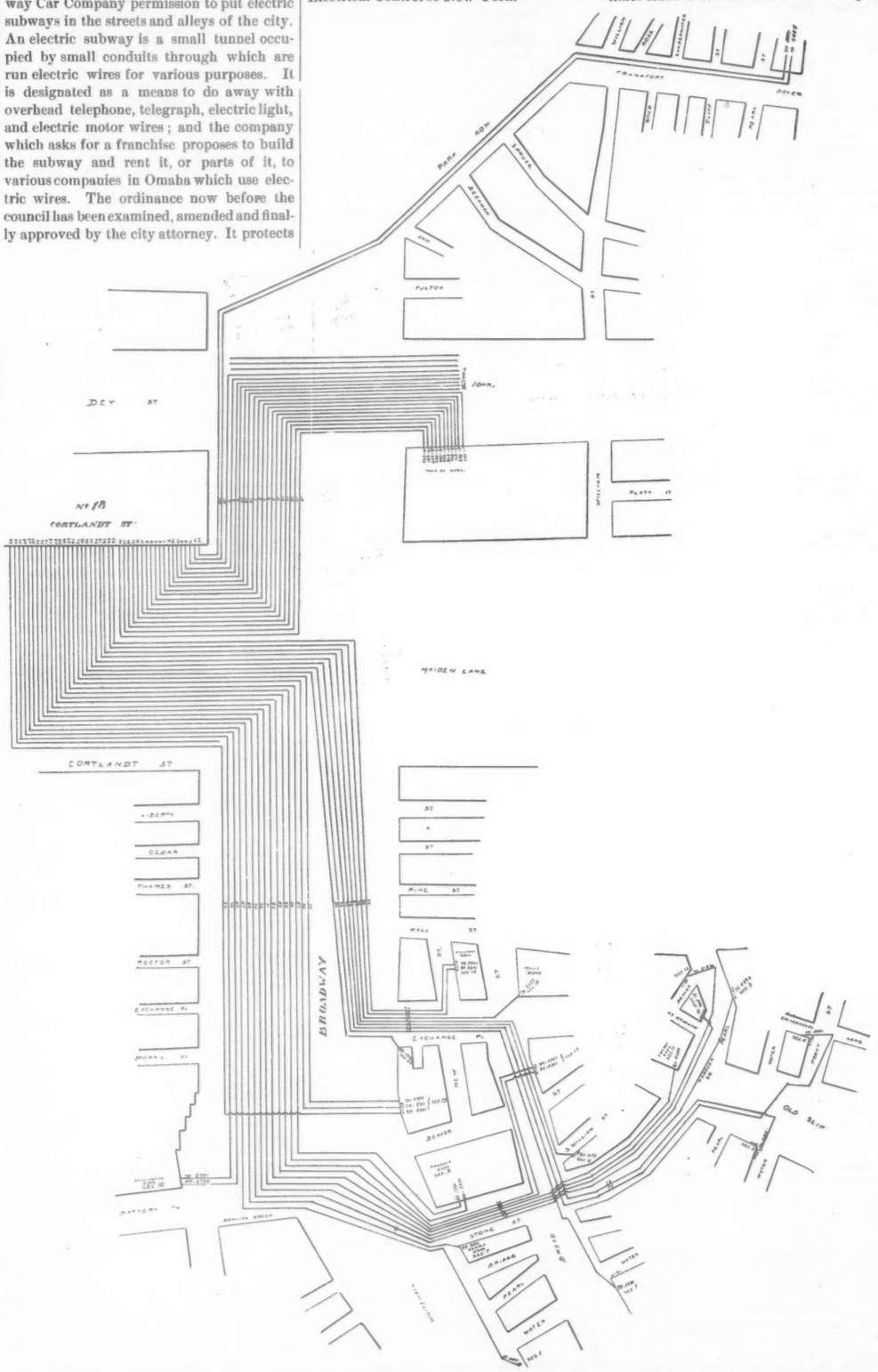

FIG. 1.—THE UNDERGROUND TELEPHONE SYSTEM OF NEW YORK.—MAP SHOWING NUMBER OF CABLES IN LOWER PART OF CITY.

In General Superintendent W. A. Vail's office, 18 Cortlandt street, he and Electrician Seeley have complete maps of all aerial and underground wires, and the location of every subscriber, the color on the map indicating the exchange with which the subscriber is directly connected. The switchboard at 18 Cortlandt street, which is the finest in the world, and which was illustrated and described in the REVIEW several months ago, is connected with the subscribers through underground cables. Most of these cables are metallic circuits, and it is more than likely that the future construction will be of that kind.

Flirting Over the Telephone Wire.

IT LEADS TO A SERIOUS LOVE AFFAIR AND A POLICE COURT CASE.

That flirting over the telephone wire sometimes leads to serious results was exemplified recently in Justice C. J. White's court, where May Wanek appeared as complainant against George H. Baker, who was charged with making threats to kill. The defendant is the son of ex-West Town Collector Baker, and is employed in his father's coal

office at 92 Washington street. Miss Wanek was employed in a branch telephone office, where she frequently had occasion to talk with young Baker "over the wire." Finally the couple met by appointment, and a love affair and the police court case followed.

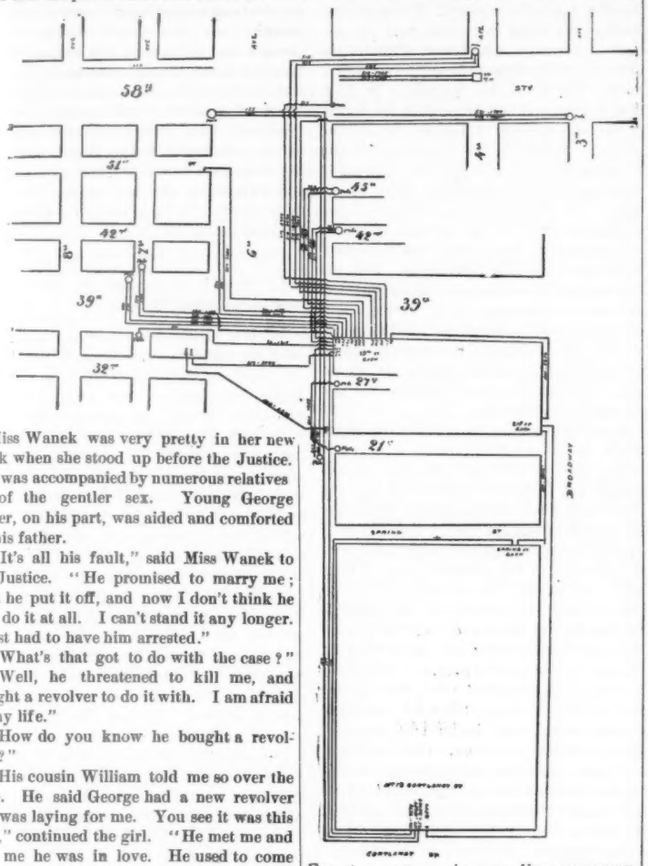

FIG. 2.—MAP OF UPTOWN UNDERGROUND TELEPHONE CABLES IN NEW YORK.

Miss Wanek was very pretty in her new cloak when she stood up before the Justice. She was accompanied by numerous relatives all of the gentler sex. Young George Baker, on his part, was aided and comforted by his father.

"It's all his fault," said Miss Wanek to the Justice. "He promised to marry me; then he put it off, and now I don't think he will do it at all. I can't stand it any longer. I just had to have him arrested."

"What's that got to do with the case?"

"Well, he threatened to kill me, and bought a revolver to do it with. I am afraid of my life."

"How do you know he bought a revolver?"

"His cousin William told me so over the wire. He said George had a new revolver and was laying for me. You see it was this way," continued the girl. "He met me and told me he was in love. He used to come to see me every night. Then we were to be married. I said February 21, but he insisted on New Year's day. I agreed, and when that day arrived he did not come. He did not come near me for a week. I was almost wild. Then we half arranged for another wedding, but that will not come off. I gave up my position and, now, perhaps, I can't get it back again."

"Why don't you settle the trouble between yourselves?"

"Well, perhaps I might. I think he ought to give me $80 for the loss of my position and my board. You see, I was home waiting for the wedding quite a time."

"I am not ready for the trial," said the defendant. "I want a few days to get witnesses."

"Did you threaten to kill the girl?"

"Why no; never thought of it."

"Did you buy a revolver?"

"No, that was just foolin'. My cousin William said it for a joke, just to scare her. I was with him in the office at the time."

"Young man, there isn't much of a joke about that. I will continue the case until Saturday, to give this young lady a chance to get witnesses."

Baker, Jr., furnished bonds in $300 to appear."—*Chicago Herald.*

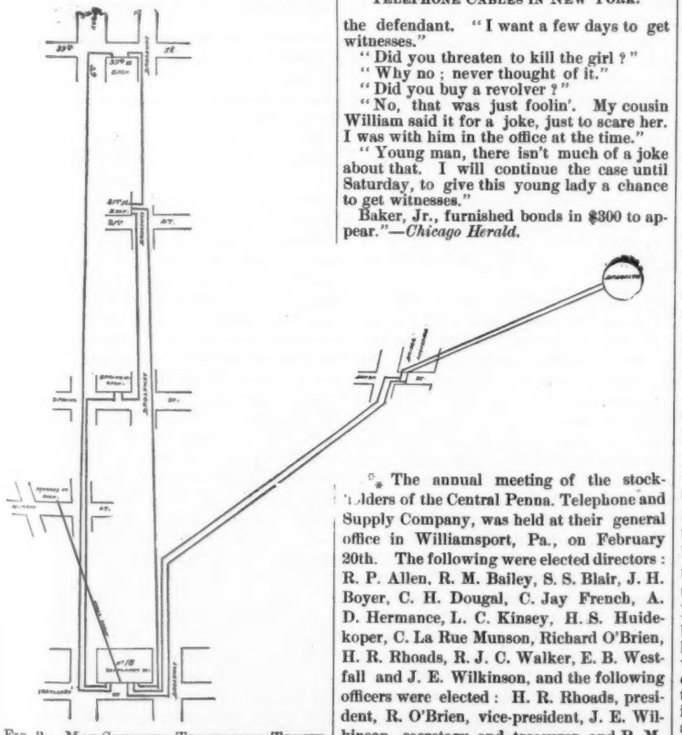

FIG. 3.—MAP SHOWING TELEPHONE TRUNK LINES (UNDERGROUND) CONNECTING EXCHANGES IN NEW YORK.

⁂ The annual meeting of the stockholders of the Central Penna. Telephone and Supply Company, was held at their general office in Williamsport, Pa., on February 20th. The following were elected directors: R. P. Allen, R. M. Bailey, S. S. Blair, J. H. Boyer, C. H. Dougal, C. Jay French, A. D. Hermance, L. C. Kinsey, H. S. Huidekoper, C. La Rue Munson, Richard O'Brien, H. R. Rhoads, R. J. C. Walker, E. B. Westfall and J. E. Wilkinson, and the following officers were elected: H. R. Rhoads, president, R. O'Brien, vice-president, J. E. Wilkinson, secretary and treasurer, and R. M. Bailey, general manager. There were 2,660 exchange subs January 1st, 1887, 2,905 subs in January 1st, 1888, 3,161 subs January, 1889. New multiple switchboards have displaced the older boards of same type during the past year at Williamsport and Wilkesbarre, Pa. One of same class having being installed at Scranton the previous year, this comprises the three largest exchanges, where there are 534 Williamsport, 615 Wilkesbarre and 668 Scranton subscribers respectively.

⁂ The annual meeting of the New York & Pennsylvania Telephone Co. was held at the office of the company, 18 Cortlandt street, New York, last Tuesday. The report of the treasurer showed a large gain over previous years. The following directors were chosen: Chas. F. Cutler, Joel C. Clark, H. L. Storke, W. N. Estabrook, C. A. Nichols, John E. Hudson and David B. Parker. At a subsequent meeting Charles F. Cutler was elected president; H. L. Storke, vice-president; Joel C. Clark, secretary and treasurer, and W. N. Estabrook, general manager.

⁂ The repeal of the law in Indiana, regulating telephone charges, passed by the Legislature of 1885, has been generally received throughout that State as a very wise act upon the part of the present body, and the company has received request from nearly all the towns and cities where exchanges were closed to open them again and give the people the advantage of telephone service. When the law was passed the company refused to continue their instruments at the legal rate, and hundreds of instruments in Indianapolis and many exchanges throughout the State were closed. Among the latter were a number of cities, and for four years the service has been crippled, and but relatively a few of the people supplied with the service. The dissatisfaction growing out of the limited service produced the repeal of the law, as every member from a city or town where an exchange was once established wanted the privilege of the service, and were willing to give the company what the latter contended was simply a fair price, $5 for each instrument per month. While only a limited number of exchanges have been in existence since the law went into effect, the company could not afford to supply the improvements that have been in use where the service was not crippled, but they propose now to put these improvements in operation, and give the people the very best service that can be had anywhere. The work of establishing exchanges and of improving the service where exchanges now exist will be begun at once, and every facility will be employed to insure a satisfactory service to the people.

⁂ Superintendent Kimball, of the life saving service, has about completed his plans for the establishment of a telephone service on Long Island Sound. When this is completed it will be put in connection with the service now in operation in New Jersey and will also be in communication with the service in Connecticut and Massachusetts. The line needed to complete the Massachusetts circuit at Cape Cod is now being put up, and will be in working order within a few weeks. These lines are being constructed by the life saving service employés, and by such means a vast saving to the government is made. Superintendent Kimball is also at work constructing telephone lines along the Atlantic coast. The coasts of North and South Carolina are now nearly connected by wire. He intends before another year rolls round to have the entire Atlantic coast in telephonic communication. He began the work a few years ago with a small amount of money and found that by patience and grit he could accomplish more than he expected. The telephone has also been thoroughly tested and has proven that the service rendered has been equal to double the force of men employed on coast duty. By means of the telephone the guards have been enabled on many occasions to summon help to their aid in a short time where otherwise the guards would have had to depend on the night and day signals, which oftentimes have occasioned great delay. Superintendent Kimball is thoroughly in earnest, and he prides himself on the success of his plans. The Long Island lines will connect all the life saving stations and will be constructed upon the latest systems. The instruments will be of the latest improvements and will have also the improved "phones" for aiding the voice. The great point he makes with the use of the instrument is that the guards will have to report at regular intervals through the telephone, thus assuring the officers in charge of them that they are doing faithful patrol duty. The work will be begun probably in April, or sooner should the weather favor it.

TELEGRAPHIC

.... Anniston, Ala., talks of putting in the Gaynor fire alarm system.

.... G. W. Thompson has applied to the San Diego, Cal., trustees for a franchise for district telegraph.

.... The Spaulding Telegraph Company, of Baltimore, was recently organized with a capital stock of $500,000, to lay underground pipes for telegraph wires.

.... Mr. J. D. Clarke, well known in electrical circles as supt. of the American District Telephone Company, at Columbus, O., has just been appointed supt. of the Gamewell Fire Alarm Co. in this city.

.... A new electric railway signal system has been patented by Mr. A. Z. Boda of Columbus, Ohio, and a company has been organized there for the manufacture of the apparatus. J. B. McDonald is president.

.... A new corporation, the Champlain Telegraph Company, has been organized to operate a line from Pittsburgh to Lake Placid, in the Adirondacks. The new line will run through Clayburgh, Chase's, Loon Lake, Paul Smith's and Saranac. It will be 100 miles long, and it is expected that the wires will be in operation in June.

.... At the annual meeting of the Tecumseh and Macon Telegraph Company on Monday, the following officers were elected: Directors, J. T. Boyce, L. G. North; president, J. T. Boyce; vice-president, J. W. Benedict; secretary, S. W. Boyce; treasurer, L. G. North; manager, C. W. Benedict. There are now 31 instruments on the line, nine having been lately added at Pennington's Corners.

.... It is reported from England that the Postmaster General has decided to introduce into the government telegraph system the typo shorthand code, invented by Professor Edwin Guest and which of late has attracted considerable attention. By this code it is possible to send one word instead of ordinary messages and press dispatches and an intelligent schoolboy can memorize it in a few hours. On Saturday an exhibition was given before a number of press professional men, actors, authors and journalists, and a boy of nine years old read off passages containing many hundred words, without a single reference to any code, book or dictionary. The saving of time by hour and wire by the adoption of this system would, it is said, be considerable.

.... H. A. Tuttle, of Minneapolis, superintendent of the postal telegraph system at that point, was instrumental in building the line from Duluth to Chicago, making a postal telegraph connection between these two points. He had charge of the work of construction, and when the line was completed was appointed superintendent, with headquarters at the "Mill City." Mr. Tuttle was asked concerning the subject of national control of all telegraph lines in the country, and he unhesitatingly declared such a measure to be in absolute antagonism to the development and the better service to be obtained from the system. "Telegraphy," he said, "is something into which one must grow by practice. Good and efficient operators are those who have made the handling of the sounder a study, and who have profited by long experience. The same idea holds good in all the various branches connected with the building, operating and managing of a large system of telegraphic lines. The history of governmental positions has been a history of changes which even civil service has not entirely succeeded in abolishing. A system of changes is unquestionably detrimental to the perfect and successful working of telegraphy. This is, of course, true in many other callings, but I speak particularly of telegraphy because in that I am posted. I know little of anything else."

* * The St. Louis electric elevated road seems to be a thing of the immediate future.

* * The West Fort Worth (Tex.) Street Railway Company have asked for permission to use electric power.

* * Americus, Ga., is to be lighted by electricity, and contemplates the installation of an eight mile electric street railway.

* * The Raleigh, N. C., Street Railway Company have had their charter amended, permitting them to use electric motive power.

* * Oregon City, Ore., is said to be erecting electrical plants to cost $100,000, and electric cars are projected from that city to Portland.

* * The St. Louis council has passed the elevated electric railway bill. The incorporators are: D. D. Bates, S. J. Fisher, Chas. Suter, Maurice Prendeville, D. S. Bentley, George F. Branham, and Ben Von Phul.

* * Newark, N. J., expects its electric road to be running before the end of the month. The Daft system is to used. The electric road is said to have caused a rise in price of property along its line, estimated at 15 to 20 per cent.

* * The Roanoke, Va., Electric Street Railroad will begin tracklaying soon. The ties for four miles of line are being distributed along the route. The line will run to Salem, 10 miles, and there will be about 10 miles more on the city streets.

* * The new management of the Camden, N. J., Horse Railroad Company, proposes to substitute electricity for horses as soon as possible. President Scull has been paying considerable attention to the storage battery system, and it may be adoped.

* * Newport citizens have been inspecting the Thomson-Houston road at Lynn, with a view toward the introduction of such a line at the noted summer resort of Rhode Island. Permission has been granted the company to use the overhead system.

* * Portland, Ore., feels the need of new street and suburban railways. Mr. T. J. Evans, a Council Bluffs capitalist recently there, was asked regarding the success of the electric road at his home, and replied that they were a great success and already very popular.

* * The New England Julien Electric Company has been formed, with a capital stock of $1,000,000. It controls the right to the system for electric traction, etc., by arrangement with the Julien Electric Company and Julien Electric Traction Company, of New York.

* * The Eddy Electric Manufacturing Co. has enlarged its force at Windsor, Conn., and has orders far ahead of the supply. The manufacture of the speed indicator invented by Rev. George F. Heath is now well under way, and many of these useful little instruments have been sold in Europe. The Heath speed indicator will be exhibited by the Edison Company at the Paris Exposition.

* * The Pond Engineering Company, of St. Louis, Mo., has secured a contract for furnishing the power plant for an electric street railroad for the Metropolitan Street Railway Company, of Kansas City. The line will run from Kansas City to Armourdale, a distance of about three miles, with an equipment of about 20 cars. The Thomson-Houston system has been adopted. This firm is also fitting up an electric light plant for Fremont, Neb., and has furnished a 125 horse-power Armington & Sims' engine for the Edison electric light Station at Little Rock.

* * The Portland, Me., Street Railroad Company proposes to put in an electric system during the year. Negotiations are pending with the Thomson-Houston and Sprague Companies.

* * The Cowles electric smelting and aluminum works at Lockport, the largest in the world and the only one of its kind in this country, will shortly be enlarged. A new company has been formed at Bridgeport, Conn., to handle all the metal that the Cowles works can produce, and roll it into rods and wires. The Cowles Brothers, the head of these gigantic enterprises, are now engaged in defending their letters patent in this country on the claims of representatives of the French electrician, Faure, who claims priority of patent, and seeks to have his established in this country. The Cowles company went through a similar experience in Germany and defeated the contestants. The Cowles Brothers have taken out letters patent in every country in Europe, and have a large plant at Trent, on the Thames, Eng., and contemplate erecting plants in France, Germany and Russia.

* * From the *Milwaukee Wisconsin*:—The first electric crane ever built in the United States has just been introduced in the foundry of E. P. Allis & Co. It is a ponderous affair, weighing 30 tons, and is capable of lifting and carrying to any part of the foundry, with ease, a weight of 25 tons. The crane is a bridge-like affair, suspended on tracks built on each side of the foundry, near the ceiling. It is provided with three electric motors. One moves the crane from one end of the foundry to the other, another moves the carriage with which the crane is provided from one side of the foundry to the other, and the other runs the lifting machinery. Its advantage over the ordinary power travelling crane, which it resembles somewhat, is a saving of power and the wear and tear of machinery. The only other electric crane known is in an English foundry, the latter being supplied with only one motor, rendering clutches and complicated gearing necessary.

* * Further particulars in regard to the University Park Railway and Electric Company, of Denver, Colo., show the capital is $75,000. The board of directors for the first year will be composed of Milo A Smith, president; G. W. Bailey, vice-president; A. M. Ghost, treasurer; S. G. Collins, secretary; and John Whisler, as representative of University Park. The term of existence of the company is to be 20 years. The articles of incorporation, which will be filed to-day confer wide powers upon the company. They are authorized to construct and operate electric, steam, horse, cable or other railways between University Park, Denver and other places in Arapahoe county; also to erect and maintain plant of every description for the purpose of lighting or transmitting power by electricity in any portion of the town of South Denver; and further, general authority to build and run railways in any part of the county of Arapahoe. Each car is to contain five incandescent lamps, while a system of arc lights will shed a brilliant illumination along the entire line. The stock is held by proprietors of real estate situated on the road.

* * The Lewiston & Auburn, Me., Electric Light Company made a very creditable showing for the year 1888. In '86 and a part of '87, the plant was located in Lewiston. It then consisted of five dynamos of 25-light capacity, and also one 45-light dynamo. The motive power consisted of three engines and two 100 horse-power boilers. About 30 miles of wire were used. During 1887, however, the company leased in Auburn a $20,000 new stone dam and water privilege, erected a building costing $8,000, 30x100 feet, with a wheel house 15x20 feet. The station now contains five 50-light arc dynamos, one 500-light incandescent dynamo, with motive power furnished by two Holmes water wheels, each 300 horse-power. They are running at present 250 arc lights, 350 incandescents, four 7½ horse-power, two 3 horse-power, three 5 horse-power, one 15 horse-power, and one 10 horse-power motors. They have 45 miles of wire, and are about adding at their station a 100 horse-power generator for motors. The work is in charge of W. E. Davis, who is a thoroughly competent man. The capital stock of the company is $180,000, and the officers for the ensuing year are: President, G. C. Wing; secretary, A. R. Savage; treasurer and manager, N. I. Jordan; directors, A. R. Savage, G. C. Wing, E. T. Gile, F. M. Jordan, D. J. Callahan, A. E. Frost, N. I. Jordan.

The Death of John Ericsson.

This great inventor died in this city, March 8th, 1889, at the age of 86. The history of his life is most interesting. Before going to England in 1826, when he was 23 years old, he had distinguished himself in Sweden, his native country, by engineering work on the Gotha ship canal, and by precocious inventive talent that attracted the attention of the highest officers of the Government. The list of his inventions in England is long, and they were all in the higher or the highest range of engineering and mechanics. In 1828 he first applied practically to navigation the principle of condensing steam and returning the fresh water to the boiler. In 1829 he constructed a steam fire engine, the prize for the best plan of which was awarded to him by our own Mechanics' Institute in 1840. In 1880 he first used the link motion for reversing locomotive engines, and the modification of his device is still employed in all locomotives. In 1832 he invented the centrifugal fan blowers now so extensively used in navigation. In an engine built by him in 1834 steam was first employed expansively.

From his boyhood up to the time of his death, the utilization of heat as a means of power gave a principal direction to the studies and ambition of Ericsson, says the New York *Sun* in an able account of his life. In Sweden he had invented a flame engine; in 1833 he first brought his caloric engine to the attention of the scientific men of England; and in 1853, after he had removed to this country, he introduced the principle into the famous caloric ship, the "Ericsson." The speed obtained by that vessel was not enough for commercial purposes, though as a scientific achievement the caloric engine won for him the Rumford medal; and these engines are still used in great numbers for light mechanical purposes. Since that time, and more especially during the period since the war, Captain Ericsson had occupied himself largely with the solution of the problem of making direct use of the force stored up in the sun's rays, and to aid in his investigations of the subject, he invented a solar engine and various other contrivances of great ingenuity.

One of the greatest of his practical achievements was the invention of a screw propeller, by which all steam navigation has been revolutionized. He first applied the principle in England in 1837, but the English Admiralty refused to adopt his invention on the ground that it would be useless in practice, "because the power being applied to the stern, it would be impossible to make the vessel steer." That dictum determined Ericsson to try his fortunes in this country, to which he was urged to come by Commodore Stockton.

He landed here 50 years ago, in 1839, and two years later designed for our navy the screw ship "Princeton," the first vessel having the propelling machinery below the water line, out of reach of hostile shot. With the building of the "Princeton" begins the history of modern naval warfare under steam. It changed the construction of the fleets of the whole world. The invention of the screw has been claimed by various individuals; but to Ericsson its practical introduction in navigation is unquestionably due.

Having thus revolutionized naval warfare, he again transformed the navies of the world by the building of the "Monitor." His first suggestion of the principle of that vessel, involving the concentration of great guns in a revolving tower of a partially submerged vessel, was made in a communication to Louis Napoleon in 1854. The "Monitor" was constructed by Ericsson in 100 days, and fresh from her contractors it encountered and worsted the "Merrimac" in Hampton Roads on March 9, 1862. It is not too much to say that, except for her and her victory, the result of the war might have been changed. The history of that encounter, and of the ironclad navy subsequently built on the "Monitor" principle, is well known, and we do not need to recount it here.

During the last 20 years Capt. Ericsson devoted himself to his profound investigations as to solar energy, to computations of influences that retard the earth's rotary motion, and to the invention and introduction of a new system of submarine attack. Though he was already a man of 62 when the war closed, he set out for himself the hardest work of his life, and with unabated physical and mental energy continued in its pursuit. He was proud of his bodily strength and endurance, and scorned to be regarded as an old man or excused from any task, however arduous, because of his years. His firmly knit figure and muscular proportions made those who observed him agree in his own impression that he might still be at his work when he was 100, for, by a careful and abstemious diet and regimen, and by daily exercise, he took care to preserve his physical health and vigor.

* * Work is progressing on the electric road at Wheeling, W. Va.

* * It is reported that a California company has made an offer through Mr. Chas. R. Lloyd to purchase the Gas & Electric Light Company, of San Diego. When asked if he thought the trade would be consummated, Mr. Lloyd replied that he did not know, but that he would establish a plant of the Brush light here, whether the trade is made or not. "I have already had an ordinance presented to the City Council, asking that a franchise be granted for the establishment of a Brush electric light plant, and I expect that it will be granted next Tuesday night." In case the franchise is granted and the purchase of the gas company's plant is not effected, Mr. Lloyd will establish a plant on the corner of Second and J streets, where the San Diego Gas Company's buildings were situated before they were moved to their present location. In case the franchise is granted and the purchase of the gas plant is consummated, Mr. Lloyd will put in the Brush plant with the present gas and electric light plant on N street. The company which Mr. Lloyd represents has a working capital of $1,500,000, and has valuable plants in San Francisco, Sacramento, Oakland, San Jose, Santa Cruz and Los Angeles. The franchise has since been granted.

* * An interesting case has come up in Harrisburg as to the character of electricity as used for lighting. The Scranton Illuminating Heat and Power Co. and Excelsior Electric Light Co., of Harrisburg, represented by ex-Deputy Attorney General Snodgrass, and the Northern Electric Light Co. and U. S. Electric Lighting Co., of Philadelphia, represented by Morgan & Lewis, of that city, and M. E. Olmsted, of Harrisburg, claim that the light they furnish is a manufactured article, and that, therefore, they are exempt from taxation under the act of 1885, which exempts manufacturing companies. The officers of the companies testified as to their methods of producing electricity and furnishing light, and Professor Henry Morton, president of Stevens Institute, and late professor of the University of Pennsylvania, who was called as an electrical expert, testified that in his judgment the electric light is an artificial and not a natural light. His testimony was scientific, voluminous and interesting. Attorney General Kirkpatrick desired to use in evidence certain works on electricity, and endeavored to identify them by Professor Morton, but he characterized most of them as "beautiful picture books, popularly interesting, but practically worthless." Others he characterized as "standard," and useful. "For the benefit of the Attorney General," queried Mr. Olmsted, counsel for the other side, "do you know of any publication upon that peculiar form of electricity known as Jersey lightning?" but although a resident of Hoboken, the professor disclaimed all knowledge of it. One of the witnesses testified that all electric lights were produced by either combustion or incandescence, and none was ever seen unless so made, but he was unable to answer Judge Simonton, who asked: "The flash we see in the sky—is that formed by combustion or by incandescence?" The testimony was all taken, but the argument postponed until some time in March.

The Inaugural Ball Illumination.

When the announcement was made in January that the contract for lighting the Pension building, at Washington, for the inaugural ball had been given to the Thomson-Houston Company, of Boston, it created much comment as being a very important contract, and one upon the successful carrying out of whose provisions much depended. The magnitude of the undertaking was hardly realized, necessitating as it did the transportation of so much apparatus from Boston to Washington, and all for one night's service. That the company and Mr. James R. Magee, who had the matter immediately in charge and to whom is due the credit of closing the contract, were equal to the task has been abundantly proven by the entire success of the undertaking.

The only portion of the plant upon the spot were four 60 horse-power low pressure boilers. A 100 horse-power engine, kindly loaned by McIntosh, Seymour & Company, of Auburn, N. Y., was taken on to furnish power, and three 400 light incandescent dynamos and a 30 arc light dynamo were sent on to generate the current. Five weeks were employed in wiring the building and putting the lamps in position. The distribution of the lamps was as follows: 152 single lamps, distributed in the arches between the lower pillars; 80 lamps in around the pagoda in the center of the hall; 12 electroliers of 64 lights each, suspended from the lofty ceiling; 96 lamps in six smaller electroliers in the supper rooms, making a total of 1,096 incandescent lamps. Six arc lamps were suspended in the upper portion of the main hall, and two arc lights were placed in each of the four entrances to the building. The remainder of the arc lights were placed on poles around the building, making a brilliant display and one that was appreciated by the crowds outside.

The effect of so much electrical illumination is better imagined than described. It was considered by people competent to judge the grandest display ever seen on an occasion of this sort. Red and blue lamps were prettily arranged in different parts of the hall, mingling their softer shades with the brilliancy of the other lamps, and adding to the beauty of the display. The committee in charge of this branch of the nation's festivities were profuse in their thanks for the very satisfactory manner in which the electric illumination was carried out.

The wiring of the building and installation of the plant was done under the able superintendence of Mr. G. H. Almon, to whom no small share of the credit is due. Mr. C. B. Davis was also present, and rendered very material aid in looking after the proper conduct of the plant during the night of the ball. Mr. James R. Magee, manager of the isolated plant department of the Thomson-Houston Company, had general supervision of the entire plant, and his splendid executive ability was perhaps never more clearly shown than in bringing about so successful a completion of the contract undertaken.

It was worthy of remark, considering the short time between the first test of the apparatus on Saturday and its operation on Monday, and that the machinery was all new, including the engine, which, however, gave great satisfaction under a very heavy load, that not a lamp burned out, no faulty wiring was shown and not an accident marred the success of the evening. It shows the affair to have been in capable hands and the fine construction and excellent qualities of the Thomson-Houston apparatus.

The Electric Sugar Quintet Offers Twenty-five Cents for a Ride Up.

The imitation-hayseed electric sugar quintet were before Recorder Smyth last week in the General Sessions, on an argument over their release on bail. Old man William E. Howard sailed into the court room with his fur cap pulled down to his ears, and when Court Captain Myhan told him to take it off he put a big flat hand to his ear, stooped over, and said, "Hey?" Captain Myhan pulled his cap off and handed it to him. Mrs. Howard, looking motherly behind a pair of spectacles (which she had not put on before), followed her husband, and her daughter, Mrs. Olive E. Friend, sole remaining possessor of the great secret for making electric sugar, came next, fat, fair and smiling. The Halstead boys lumbered behind their chiefs like a farmer's hired men.

Assistant District Attorney Davis asked that each defendant be required to plead to three indictments for grand larceny. They pleaded not guilty, with liberty to withdraw the plea.

Clerk Davenport read the indictments, which charged them with stealing $6,500 from Lawson N. Fuller for stock, and $1,000 for buying machinery for the Electric Sugar Refining Company, and also for obtaining $35,000 from the company for machinery.

Mr. Howe asked that bail should be light, and added:

It might as well be said now as at any time. This lady is innocent. We claim that the prosecution is influenced by Cotterill, president of the Electric Sugar Company. He is the district attorney's Pigott, and he is trying to cover up very many of his transactions by following up and prosecuting my clients.

Assistant District Attorney Davis in reply said that the frauds were unparalleled for audacity. The recorder remanded the prisoners to the Tombs until Monday, when he will fix bail. Howard said to Deputy Sheriff Burke in the corrider of the General Sessions:

"Say, I'll give you 25 cents to take us up in nice shape."

They walked up.

—— Work on the new buildings of the Fort Wayne Jenney Electric Light Co., at Fort Wayne, Ind., has already been begun, and when finished it is claimed the works will be the largest of the kind in the country and will furnish employment to nearly 1,000 people.

—— Bids for lighting the city of St. Louis were submitted by the following: Husler Electric Light Co., Thomson-Houston Electric Co., Laclede Gas Light Co., Charles A. Brown, Charles Sutter and the Missouri Electric Light Co. The companies bidding at so much a lamp per year in each class. A committee from the board will canvass the bids and draw up a statement of the lowest.

—— A certificate of incorporation of the Citizens Electric Light Company has been filed at Helena, Minn. The object of the company is to purchase the franchise granted to William B. Sterling and to build, construct, operate, repair and maintain an electric light and power station in Helena. The capital stock is $50,000, and the incorporators Wm. B. Sterling, John Worth and Harry C. Sterling.

—— The Electrical Accumulator Company have commenced a second suit in equity against the Julien Electric Company, charging infringement of the Sellon patent covering the use of an alloy plate in secondary batteries. The same corporation has also instituted suit in equity against the Gibson Electric Company on three several patents of Faure, Swan and Sellon, covering improvements in secondary batteries.

—— The stockholders of the Newport, R. I., Incandescent Electric Light Company organized recently under the charter recently granted by the general assemby, and selected the following board of directors: John D. Richardson, Howard Smith, Thomas P. Peckham, George P. Coggeshall, J. D. Richardson, Jr., and Robert C. Cottrell. The directors afterwards elected the following officers: President, J. D. Richardson; secretary and treasurer, R. C. Cottrell; general manager, J. D. Richardson, Jr.

—— The electric lights were started in Seymour, Conn., for the first time, Tuesday night. The plant belongs to the New Haven Copper Company, and runs 22 lamps, 17 in the mill and five on the outside fronting their property. They will erect three more for the benefit of the public. Each lamp is 800 candle power. James Swan, the augur manufacturer, will put in a dynamo for lighting his factory and the streets adjacent thereto, and a second plant to light his house with the incancescent system.

—— The London *Electrician* prints a singular rumor to the effect that the use of the compass is about to be altogether superseded. A method is said to have been discovered by which the true north may at any moment be ascertained by means of a device which is wholly independent of magnetic action. The reading is, however, obtained by electrical means, and it is said that a well-known Berlin firm of electricians has secured the patents. The informant also surmises that gyroscopic action is involved.

—— A bill has been introduced into the Legislature to appropriate $30,000 for an electric light plant for capitol building and grounds at Austin, Tex.

—— The Dedham and Hyde Park, Mass., Gas and Electric Light Company has recently installed a Ball lighting plant, which is operated by a gas engine.

—— At a special meeting of the Malden and Melrose Gas Light Company last week it was voted to increase the capital stock from $170,000 to $220,000.

—— At Portland, Ore., the Westinghouse Electric Company is preparing to utilize a water power 12 miles distant from the city for electric lighting purposes.

—— T. J. Stewart & Co., of Bangor, have contracted for an electric light plant of the Thomson-Houston system with a capacity of 50 lights, for their spool mill at Milo, Me.

—— An electric light company has been organized in Ashland, N. H., with a capital of $6,000. Thomas P. Cheney is president, and Francis M. Hughes, secretary and treasurer.

—— Anthony Bros., of Chico., Cal., whose electric light works were burned a few months ago, have their new plant rebuilt. This will give Chico two electric light companies.

—— North Adams capitalists are negotiating for the Frankton mill plant at Shelburne Falls with a view to starting an electric light company. The present water wheel will furnish 70 horse-power.

—— A machine which, it is claimed, practically eliminates any danger associated with electric lighting, has been invented by James Irwin, of the firm of Robinson, Irwin & Co., machinists, Steubenville, O.

—— The San Diego, Cal., trustees have granted to Mr. Lloyd, agent for the California Electric Light Co., a franchise for an electric light plant. Two 60-light Brush machines will be put up at once.

—— On one of the Thomson-Houston motors in use on the electric railway at Wichita, Kan., a copper brush was in continuous use for 65 days, during which time the car covered a distance of 4,300 miles.

—— During the recent meeting of the mining engineers in this city, an excursion was made to the Edison laboratory at Orange, N. J., and the engineers and their friends were entertained at lunch by Mr. Edison himself.

—— The contract to install an electric plant at the new Pacific mill, at Lawrence, Mass., has been received by the Edison Electric Illuminating Company. The plant will have a dynamo capacity of 650 incandescent lights.

—— Inspector Powell, chief of the electrical department at Washington, is in New York. His mission is to review the work done by the United States Electric Lighting Company in the Custom House building, and report upon its merits to the Government.

—— The Toledo electric light boys gave their first social party at Clark's Hall, last week, and all who were present voted it a perfect success. The members of the club are: John J. Carr, John H. Marriott, Emil W. Schauster, Fred. Heitzelman and George Burham.

—— The electric light plant installed by the Schuyler Company at Marion, Ohio, has been accepted by the local company and the cash paid. This plant was put in on approval and the light was so satisfactory that the whole matter was settled up within 30 days after starting of lights. This is the kind of business that the electric light companies like.

—— The subject of electric street lighting is receiving an unusual degree of attention at the hands of the city council committee on lighting streets, of Springfield, Mass. A large number of petitions for the extension of the electric light service have been received. A careful investigation of relative costs of lighting in various cities has been instituted.

ELECTRIC LIGHT NEWS

—— Argentine, Kans., wishes an electric light plant.

—— Windsor Locks, Ct., is going to have an electric light plant.

—— Camden, N. J., is petitioning for more electric illumination.

—— San Marcus, Tex., wishes to build or secure an electric light plant.

—— The Edison Company will probably increase their Albany, Ga., plant.

—— The city of Marietta, O., has voted to put in a plant at a cost of $15,000.

—— Munroe, Mich., is ready for bids for arc, incandescent or combination plant.

—— Work is progressing on the plant of the Bristol, R. I., Electric Light Company.

—— Incandescent lights have been put in the Longue Pointe Asylum at Montreal, Can.

—— Thomasville, Ga., has contracted with a company to light the city for five years.

—— The city of Troy is making a new contract with the local light company for 271 arc lamps.

—— The electric light poles are all up at Bessemer, Ala., and that city is now lighted by electricity.

—— Evanston, Ill., and Rockville, Ct., are contemplating the establishment of electric light plants.

—— The city of Oxford, O., has voted in favor of issuing bonds for $25,000 for an electric light plant.

—— The citizens of New Haven like the electric light so well that they are sending in many petitions for more lamps.

—— The new Mount Holly, N. J., electric plant cost $14,000. It is being given a ten days trial before acceptance.

—— The U. S. Electric Light Company have asked permission to lay underground conduits in a large number of Washington streets.

—— The Fairhaven Land Company propose building an electric light plant at Whatcom, W. T.

—— A. J. West, of the recently organized Aberdeen (W. T.) Electric Company, is purchasing in the East a plant for lighting the town.

—— It is reported from Lynn, Mass., that Gen. B. F. Peach, Jr., of that city, has been elected secretary of the Thomson-Houston Company.

—— Harrison, N. J., has been having some trouble with the local electric light company with a possibility of the contract being broken.

—— The Oglethorpe Electric Company, of Savannah, Ga., capital paid in, $50,000, has been incorporated to establish electric light and power plants.

—— The Peninsular Electric Light Company, of Hancock and Houghton, is making arrangements to put in a central electric light plant at Red Jacket, Mich. It is designed that the plant shall cover Calumet.

—— The suit between the Edison-Swan Electric Company and Mr. Holland, a customer of the Anglo-American Brush Electric Light Company, which was decided in the Court of Appeals in London a few days ago in favor of Edison, has been appealed to the House of Lords, and a decision will be handed down in the case within a short time.

MANUFACTURING NOTES—MORE CONVENTION MATTER.

Messrs. Leonard & Izard, of Chicago, through the Sprague Motor Company, have closed the contract to construct an electric railway for Atlantic City.

The stock of Thomson-Houston Electric Light Company was quoted as high as 360 last week. Their showing was evidently very good last year.

The Sperry Electric Company are satisfied with the result of the electrical exhibit, and are ready and willing to join in making a success of an exhibit on a far larger scale.

The very striking new catalogue of the Empire City Electric Company is in great demand. At the Chicago Convention Mr. David Chalmers, of the Empire Company, found it difficult to supply them fast enough.

The Standard Underground Cable Company has secured the entire contract for furnishing the Missouri Electric Light and Power Company, of St. Louis, with weather-proof line wire amounting to over 100,000 pounds.

The Sperry Electric Company, Chicago, have had many inquiries regarding the convenient switchboard they exhibited at the Electric Light Convention, and also for their new lamp, which can be arranged to burn on any circuit.

The Pumpelly Storage Battery Company have rented more storage room, and now have three times the capacity they had before the convention. The convention seems to have borne excellent results with them, and they have more orders than they can fill.

The Sperry Electric Company, of Chicago, have recently shipped a 20 arc light improved Sperry dynamo and lamps complete, to the Belvidere Electric Light Company, Belvidere, Ill., and same is now in operation. This makes the fifth Sperry dynamo the Belvidere Company have added to their station, which speaks well for the system.

Lodge, Davis & Co., of Cincinnati, manufacturers of improved engine lathes, shapers, drill presses, iron planers and brass-working machinery, have opened a store in the new block at the corner of Lake and Canal streets, Chicago. Mr. E. D. Goodwin, for many years with the firm in Cincinnati, will have the Chicago management. They will carry a full line of their goods in this house.

The Connecticut Motor Company, of Hartford, Conn., whose directors are Sidney M. Gladwin, Robert E. Dunston and Clarence C. Sterling, are now in the motor field with their new one, two and three horse-power motors. They will also soon have five and ten horse-power motors in stock. The New York selling agency is held by Messrs. Fleming & Kimball, of 17 Dey St.

The demand for electrical wires properly covered and insulated, has increased the demand for insulated thread made by the W. Warren Thread Works, Westfield, Mass., and they are now erecting a new extension to their mill, and have already put in engine and boiler to assure them of power in case they are troubled by low water the coming summer.

The Belding Motor Company, of Chicago, are making excellent progress, although they have been in the field but a short time, and they already have over 100 electric motors at work in Chicago. This naturally is pleasing for Mr. Dexter. Messrs. G. L. Morgenthan & Company are operating 100 sewing machines with a two horse-power Belding motor, and pronounce its working perfection.

The Electrical Supply Company, of Chicago, already so well known throughout the country, bid fair to further extend their trade and reputation with some new specialties which they have just made arrangements for handling. Among these are cedar poles, upon which very low prices can be made; lava insulators, manufactured exclusively for this company, and having, it is claimed, advantages over porcelain; a new rope, which by a special process is made thoroughly weather-proof; the Fowler dynamo speed indicator, for which the exclusive Western agency is held; and the Beattie battery zincs. Arrangents have been made to carry these zincs—which are amalgamated throughout their entire mass, giving a long life—in stock at all times, the Electrical Supply Company acting as Western agents.

An interesting sale just completed by the Brush Electric Company, of Cleveland, is that of a 100 horse-power primary generator and 75 horse-power motor, to be used in running a paper mill in Georgetown, Can. The generator is to be driven by water-power at a point distant about three-quarters of a mile from the mill. Among recent lighting installations or increases by the Brush Company is that of 200 arc lights for the Brush Electric Illuminating Company, of New York, and new local Brush Companies at Phœnix, Ariz., Flagstaff, Ariz., Las Vegas, N. M., and at Prescott, Ariz.

The output of incandescent lamps of the Sawyer-Man Electric Company during the month of January, 1889, was 55,400. These were manufactured and sent out from the New York establishment. At Pittsburgh nearly as many more of these lamps were manufactured and sold, making a total of 100,000 lamps for the month. All the business connected with the manufacture and handling of the Sawyer-Man incandescent lamps will be done at the New York office, under the direction of General Manager P. H. Alexander. This lamp output is a remarkable indication of the great demand there is for incandescent lighting, and is also a high compliment to the popularity of the Sawyer-Man lamp.

W. B. Cleveland's well known switches are being handled by the Central Co. The Chicago exhibit included Okonite, Candee wires, submarine cables, and a full line of flexible cords in new and very handsome designs. The Central Company also showed a variety of the Butler hard rubber goods which they represent, and also a full line of the Cleveland arc and incandescent switches. Other features of the exhibit were the new Manson tape, samples of which were actively demanded; the Lockwood ammeter and polarity indicator, which is controlled by the Central Electric Company, and was inpractical use on the lighting circuit in the building, and general supplies and construction tools. Pettingill, Andrews & Co., of Boston, made a specialty of the Royal fire ampere switches and the K. W. cut-out rosettes.

The Phœnix Glass Company occupied one-half of the art room department B, and as stated in a previous issue made one of the most artistic exhibits in the building. Where so many beautiful and novel designs in cut glass and porcelain are shown, it is not easy to single out any one or two for special mention. Two large globes 12 and 14 inches in diameter and made of the finest cut crystal, were features which were very striking and attracted general attention, as they threw forth in thousands of scintillating rays the light of the incandescent lamps within. Other attractive specialties, acorn shades, the needle etchings made only by the Phœnix Company, in this country, prisms and beaded globes, combination colored cut glass, a complete line of arc globes adopted to all systems and a variety of the finest decorated globes, porcelain reflectors, cameo shades, and a line of opalescent and etched goods. The Phœnix Company was represented by Mr. A. H. Patterson and Mr. E. H. Fox.

Among the many pleasant incidents connected with the visit of the New England delegates to the Chicago Convention of the National Electric Light Association was the presentation to Col. C. M. Ransom of a unique souvenir of the trip. Col. Ransom had so successfully piloted the party from Boston to Chicago *via* the Niagara Falls' where a delightful half day was spent, tha his friends could not refrain from an expression of their appreciation of his efforts. They, therefore, summoned the Colonel to meet them after the final adjournment of the Convention, when they presented him with a silver medal, bearing on one side a fac simile of the Wagner car "Tamarack" (the special car in which the trip was made), and on the reverse side a suitable inscription in commemoration of the occasion. The Colonel accepted the token in his usual graceful and hearty manner, after which the whole New England party partook of the banquet, such as only the New England boys know to get up.

The New York Belting and Packing Company, New York, enjoy the reputation of making the finest machanical rubber goods in the world, and also the rare faculty of knowing just how to let the public become aware of it, through liberal and judicious advertising and capable energetic representatives. Their latest lucky stroke is in having secured as their Southeastern agents the Atlanta Rubber Company, of Atlanta, Ga. This firm will carry a very large stock and complete assortment of the New York Belting and Packing Company's vulcanized rubber goods, from which orders can be filled without an hour's delay—a fact of interest to everyone who handles or sells mechanical rubber goods in the Southeast. During their existence of some six years they have built up an excellent reputation for square dealing, careful and prompt attention to orders and business courtesy. The New York Belting and Packing Company is to be congratulated in securing their services, as the new South is fast developing its manufactures and will constantly demand more and better supplies of this kind, and no one is in a better position to advance their interests in this territory than these new agents.

Among those who favored the REVIEW headquarters with personal calls during the Chicago Convention were: Mr. L. W. Burnham, of the Electric Gas Lighting Co., Boston; Mr. R. B. Day, of the Stilwell & Bierce Co., Dayton; J. E. Dallon, of the Steele & Johnson Manufacturing Co.; Dr. A. F. Mason and Mr. J. H. Mason, of the Simplex Co., Boston; Mr. H. M. Hugunin, editor Chicago *Journal of Commerce*; Capt. J. B. Lucas, of the same paper; Mr. James Powell and Mr. H. R. Ferris, of the William Powell Co., Cincinnati; Mr. A. Crossman president, Mr. L. Mendelssohn, treasurer, and Mr. G. W. Martle, general manager, Pumpelly Storage Battery & Motor Co.; Mr. John M. Duncan, Western agent of the John T. Noye Manufacturing Co.; Mr. Charles K. Giles, of Giles Brothers, Chicago; Mr. F. A. Magee, of the E. S. Greeley Co., New York; Mr. B. M. Des Jardins, Chicago; Mr. F. E. Pettingell, Boston; Mr. Shelden, of the Schuyler Co.; Mr. W. H. Lawrence, Mr. H. E. Hayes and Mr. J. S. Scoville, of the National Carbon Co., Cleveland; Mr. J. M. Talcott, of the *Inter-Ocean*; W. J. Morrison, of the Ft. Wayne Jenney Co.; Mr. S. H. Coale, of the Belding Motor Co.; Messrs. Coleman & Hatch, of the H. W. Johns Manufacturing Co.; Mr. G. M. Barker, editor of *The Stationary Engineer*; Mr. Albert Fisher, with Fairbanks, Morse & Co., Chicago; Mr. William E. Quimby, of the Weston Electrical Instrument Co., Newark; Mr. E E. Horner, of the Eaton Rapids Electric Light Co., Michigan; Messrs. G. A. Redman and J. Gerling, of the Brush Electric Co., Rochester; Mr. F. R. Giles, of Chicago; Mr. Phiny Norcross, electrician of Janesville, Wis.; Messrs. Conant & Hood, of the Electrical Accumulator Co.; Mr. H. P. Lucas, of the Washington Carbon Co., Washington, Penn.; Mr. William Boylston, of the Marinette Iron Works Co., Chicago; Mr. C. W. Ward, of the Paillard Non-Magnetic Watch Co.; Mr. S. J. M. Bear, of Chicago; Mr. S. E. Gross, of Chicago; Mr. Charles T. Wirt, of Chicago; Mr. Charles E. Nixon, of the *Inter-Ocean*; and a majority of the delegates and attendants at the convention as already published in the REVIEW.

The Electric Crane of Messrs. E. P. Allis & Co.

The E. P. Allis Corliss Engine Works, of Milwaukee, have constructed and now have in operation a 25-ton crane of 60 foot span, with a hoist of 25 feet. The main girders are the usual construction, carrying a trolley, on top of which is the hoisting machinery, consisting of an eight horse power Sprague motor, connected directly with the drum by suitable gearing.

The motor is reversible, and is used for hoisting and lowering the crane.

The trolley also carries a three horse power motor, which moves it backward and forward on the bridge. The current is conveyed to the trolley motors by insulated copper strips, secured to the bridge by means of suitable sliding contacts.

The movement of the bridge is affected by a separate eight horse power motor geared to the truck wheels.

These motors are controlled, both as to speed and direction, by switches in front of the operator on a platform at the end of the bridge.

This monstrous crane was designed and invented by A. J. Shaw, of the E. P. Allis Company. The electrical details were carried out by Jacob Cloos, who acted as consulting electrician. The Allis Company are so well satisfied with the working of this crane that they have decided to construct another one.

New Brush for Railway Motors.

The Thomson-Houston Electric Company has recently made a great improvement in motor business by substituting for the copper brush one made of carbon.

The copper brushes heretofore used are of an original design, patented, and allow the armature to rotate in either direction with perfect freedom, and are always maintained at an even pressure upon the commutator. They have always produced excellent results, but the experiment made with the carbon brush led to the belief that it possessed points of superiority over the copper, which supposition has since been found to be correct. The carbon brushes are now in general use on all the railways using the Thomson-Houston system.

Reports concerning the wearing of this brush and its effects upon the commutator have been received, which certainly speak highly of its workings. On some of these roads there are many heavy curves and grades, and the motors are called upon to do unusually heavy work.

One report states: "The commutator is in good order, and the carbon has been worn less than $\frac{1}{32}$ of an inch after running seven days of 16 hours each. I have another set which is doing equally as well." Another states: "I have not taken out any of the carbon brushes yet. They have been running for 19 days in two cars." A later report from the same place states: "I have one set of carbon brushes in car No. 1 27 days, and in that time the car has made 557 round trips, and the brushes are good for several days yet."

The following is quoted from a letter written by Mr. W. S. Wales, president of the Third Ward Railway Company, Syracuse, N. Y.:

"We have given a trial to both the copper and carbon brushes, and are now using exclusively the carbons, as we consider them exceedingly satisfactory, serviceable and economical, preventing a large wear on the commutators."

Necessarily, in a complete system all the small details must be worked out with care and attention. The commutator and brushes of an electric motor are vital parts, and too much cannot be said in praise of any appliance which will reduce the wear between them.

—— The stockholders of the Edison Electric Light Co., of Providence, met Wednesday to accept the charter granted by the General Assembly. They elected the following named directors: Cornelius Vanderbilt, Louis Lorillard, A. C. Titus, Ogden Goelet, T. M. Seabury, R. L. Willing, R. C. Derby, and F. S. Hastings, secretary of the Edison Manufacturing Co. They, in turn, organized by electing Louis Lorillard, president, and John Wipple Secretary and treasurer.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 5, 1889.

398,662 Electric railway; Sidney H. Short, Columbus, Ohio.
398,663 Switch mechanism for electric railways; Sidney H. Short, Columbus, Ohio.
398,668 Regulator for dynamo electric machine; Elmer A. Sperry, Chicago, Ills., assignor to the Sperry Electric Company, same place.
398,731 Electrical bathing machine; Jack W. James, Cuba, Tenn.
398,748 Automatic railway switch; Joshua Render, Hagerstown, Md., assignor of one-half to Thomas E. Mittag, same place.
398,769 Electric circuit coupler; Stanley C. C. Currie, Philadelphia, assignor to the United Electric Improvement Company, Gloucester City, N. J.
398,774 Incandescent electric lamp; Thomas A. Edison, Menlo Park, N. J.
398,794 System of synchronizing electric motors; Francis J. Patten, New York, N. Y., assignor to J. M. Seymour, same place.
398,814 Electrical tramway; Henry T. Blake, New Haven, Conn.
398,833 Printing telegraph; Frederick H. W. Higgins, London, England.
398,870 Hanger board for arc lamps; James J. Wood, Brooklyn, N. Y.
398,896 Electric alarm clock; Samuel Kahan and Albert W. Craven, Melbourne, Victoria.
398,906 Arc lamp. 398,907 Electric arc lamp. William L. Silvey, Lima, Ohio.
398,912 Method of manufacturing screws and bolts by electricity. 398,913 Electrical welding machine. 398,914 Electric metal working and welding machine. Elihu Thomson, Lynn, Mass.
398,926 398,927 Electric current regulator; Joseph W. Balet, New York, N. Y., assignor of one-half to Robert Dunlap and Luke F. Cozans, same place.
398,963 Crossing conduit for electric railways; Isaac W. Heysinger, Philadelphia, Pa.
399,019 Process of electric welding; Charles L. Coffin, Detroit, Mich.
399,052 Secondary battery; Edward R. Knowles, Brooklyn, assignor, by mesne assignments, to the Mutual Electric Manufacturing Company, New York, N. Y.
399,054 Electric arc lamp; George M. Lane Asbury Park, N. J.
399,057 Interrupter for electric circuits; Isaac E. Lecoultre, Lausanne, Switzerland.
399,059 Electric motor; Orazio Lugo, New York, N. Y.
399,084 Couch for applying electrical treatment; John B. Schmalz and John B. Faulkner, Norfolk, Va.
399,088 Dynamo electric machine; Wm. L. Silvey, Lima.
399,091 399,092 Electric railway; Harry W. Smith, Newark, N. J.
399,128 Self winding electric clock; Frank W. Brainerd, Chicago, Ill.
399,134 Electric lamp fixture and switch. 399,135 Electric switch. Louis W. Dillon, North Attleborough, assignor of one-half to Homer M. Daggett, Jr., Attleborough, Mass.
399,137 Electrical store service apparatus; Richard N. Dyer, East Orange, N. J., assignor to William S. Lamson, Lowell, Mass.
399,147 Regulator for dynamo electric machines; Jesse F. Kester, Terre Haute, Ind., assignor of three-fourths to Joseph H. Briggs, same place.
399,154 Automatic telegraphy; John O'Neil, New York, N. Y.

REISSUES.

10,989 Telephone exchange; William B. Vansize, Plainfield, N. J.

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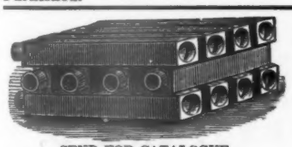
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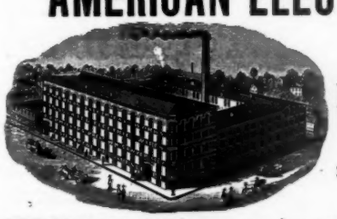
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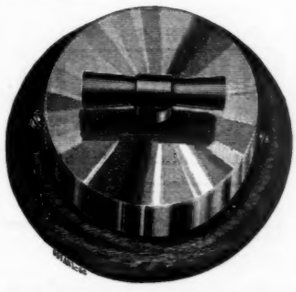
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FIG. 1.

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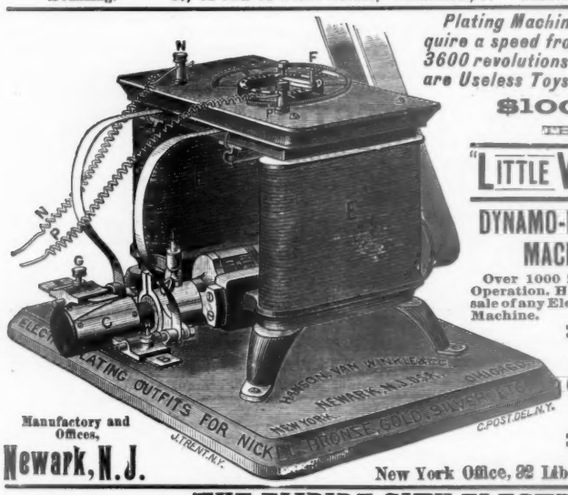
FIG. 2.

Shows Oil-Feed Cut-off when machine stops.



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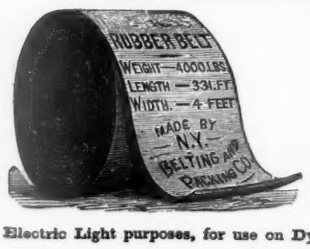

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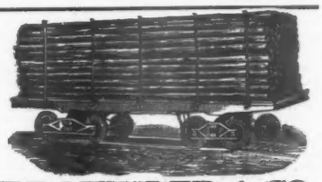

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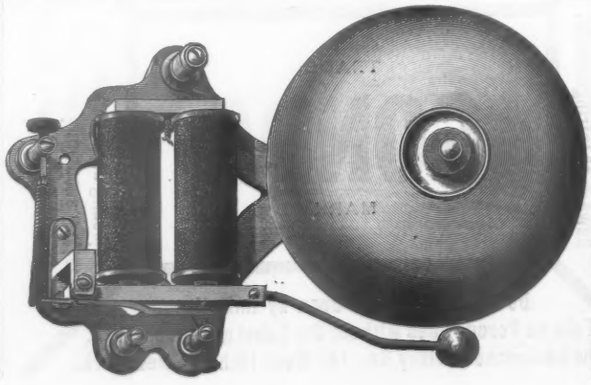

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Resistance, -	3,900	162	12	5 2

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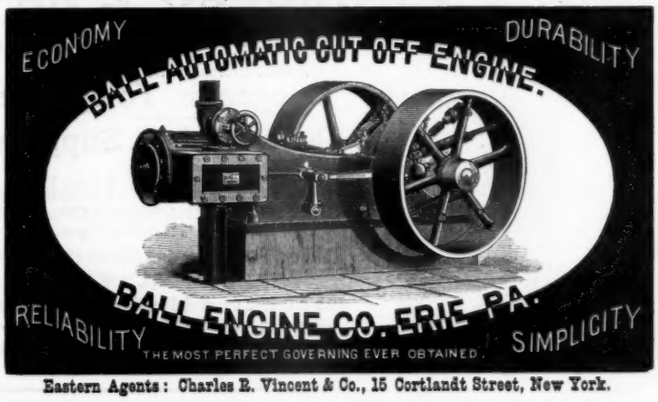

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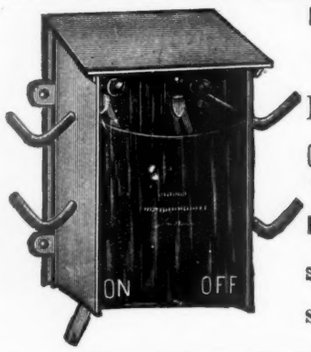

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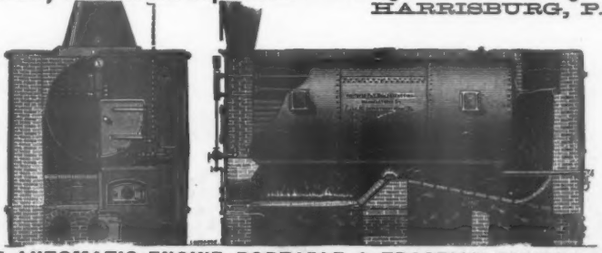

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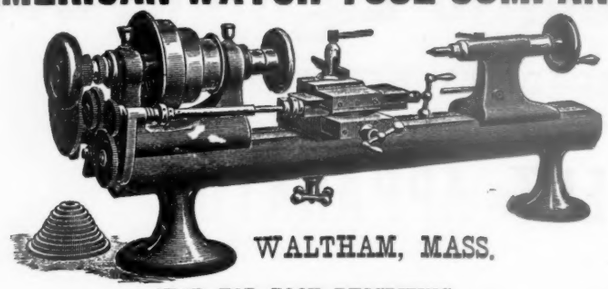

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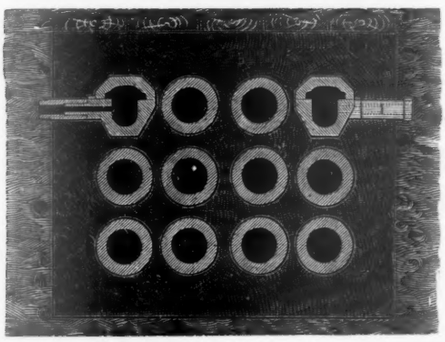

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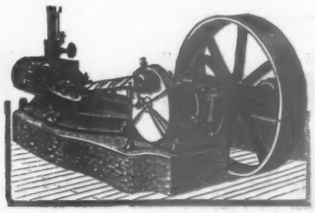

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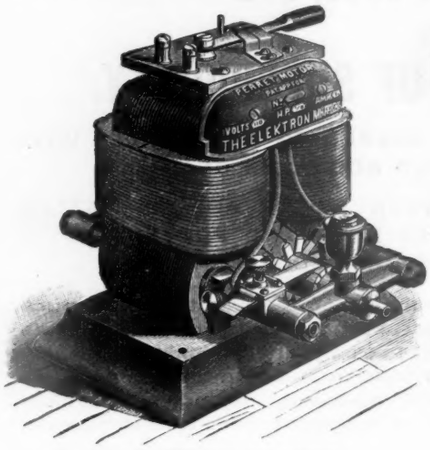

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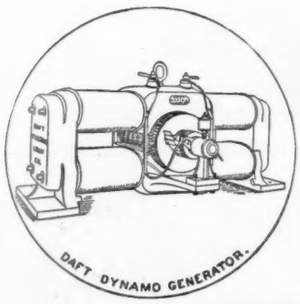

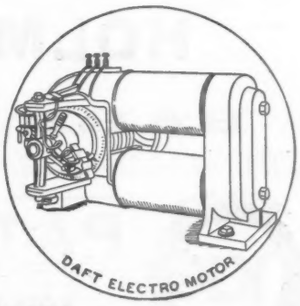

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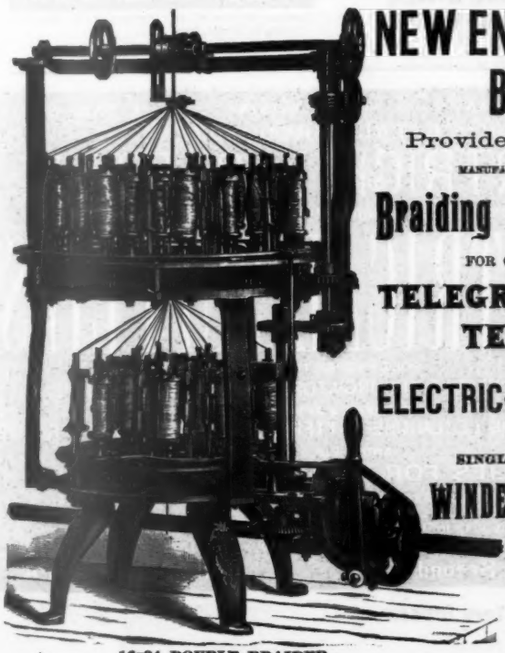

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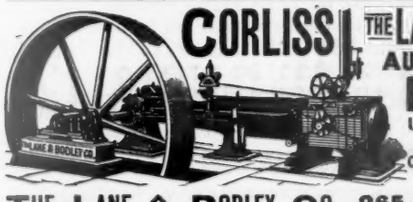

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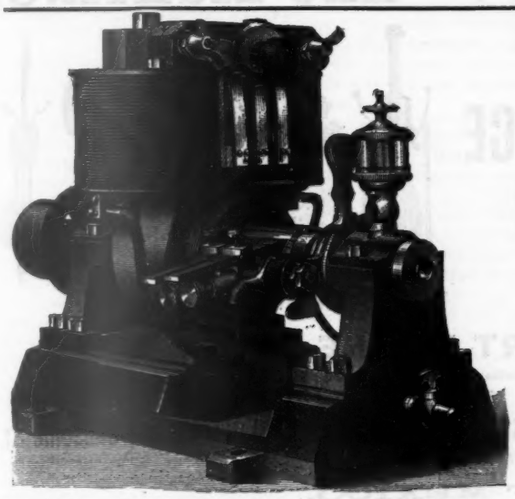

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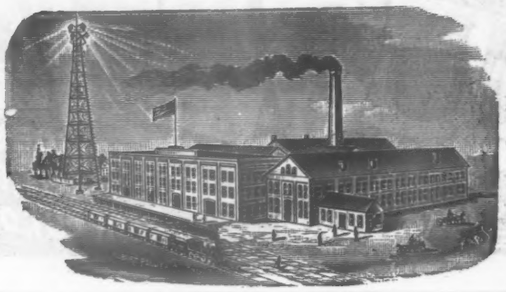

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